Acquiring Highway Transportation Information From Abroad: Final Report

FHWA's Scanning Program

November 1994

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FHWA International Technology Scanning Program

Acquiring Highway Transportation Information From Abroad: Final Report

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16. Abstract

The objective of the project was to provide suggestions for improving the acquisition and dissemination of transportation information from developed countries. The study included a survey of FHWA staff and other highway professionals, a visit to information database producers in Europe and Japan, an inventory of foreign information sources and document vendors, a citation and document acquisition analysis of databases that contain foreign records, and a final report with recommendations.

Study results concluded that the U.S. highway community does not regularly access foreign and domestic online databases; foreign database producers (OECD and ECMT) collect records (in English, French, and German) from approximately 30 advanced countries; research-in-progress information is not consistently included in these databases; Japanese information is not easily accessible in the U.S.; and foreign documents cited in the subject databases of NTIS and COMPENDEX can probably be acquired domestically, whereas in TRIS, IRRD, and TRANSDOC, probably only about one-third to one-half of the documents cited can be acquired in the U.S.

Recommendations include: improving access to information resources by developing a national transportation library system; providing education and training; conducting periodic international conferences for information providers and users; developing a national transportation information link connecting catalogs and databases from different sources; providing better access to translation services and products; and providing resources to TRIS to include foreign-language records and other bibliographic information from abroad.

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PREFACE

The authors would like to express their appreciation to the scanning team members.

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The authors would also like to express appreciation to the governments of and private organizations in the United Kingdom, France, Germany, and Japan for cooperating in this investigation.

EXECUTIVE SUMMARY

The principal goal of this project was to provide recommendations that would strengthen United States access to transportation information from abroad. The impetus for this project was based on the Intermodal Surface Transportation Efficiency Act (ISTEA), which gives the Federal Highway Administration (FHWA) authority to alert the domestic highway community to "technological innovations abroad that could significantly improve highway transportation in the U.S., to promote U.S. highway transportation expertise internationally, and to increase transfers of U.S. transportation technology to foreign countries."

As foreign transportation information can be difficult to access, and current online information databases are often deficient in research results; policies; standards; and regulations, the flow of foreign information to the United States was studied. The principal goal of this project was to present recommendations that would increase the availability of foreign transportation information, thereby strengthening the U.S. transportation community's access to information on worldwide technological developments and trends. To meet the project objectives, the following tasks were accomplished:

- a survey to identify and assess the U.S. transportation community's need for foreign technical information;
- an analysis of the current means for making foreign technical materials available in the United States;
- an inventory of the technical materials produced by foreign organizations and their availability in the United States (determined by visiting select transportation organizations in Europe and Japan); and
- a list of recommendations and costs for improving the identification, acquisition, and dissemination of foreign technical materials, especially those elucidating the most current technology and research developments.

SURVEY OF USER NEEDS

A survey to determine user needs for foreign transportation information was conducted among FHWA personnel (from all of the technical departments and region and division offices) and nongovernment representatives of transportation associations and organizations (such as the Transportation Research Board, American Association of State Highway and Transportation Officials, and American Society of Civil Engineers).

The survey was designed to collect three categories of information: respondents' background, including department, technical areas of interest, and language capabilities; current methods of obtaining information, including questions on methods of obtaining information, frequency of database use, awareness of services, and document acquisition methods; and foreign information needs, including questions on importance of foreign information, awareness of services, frequency of document requests, translation issues, and reasons for not using or acquiring foreign information.

Results of the survey were based on responses from 105 participants (79 percent of the sample that was mailed the survey). The survey participants were mostly technical transportation information gatherers and information end users; their interests covered a broad range of highway transportation subject areas. In addition, they periodically traveled abroad and had in-house staff who were multilingual (predominantly in Spanish, French, and German). Current awareness was primarily gained through conferences, professional journals, and research reports. They also used foreign contacts, primarily in the government and private sectors. Use of online and CD-ROM databases was not a prime method of identifying information. Respondents felt that it was important to be aware of foreign developments, and they relied on the same information-gathering methods for their domestic information needs. They regularly requested foreign documents, mostly from Western Europe, Canada, and the United Kingdom. Of the foreign documents ordered, one-half required translation, and one-half of those documents could be translated by in-house staff. Participants were largely unaware of foreign transportation online database and document delivery service vendors.

FOREIGN INFORMATION SOURCES

A task report identified information sources needed to strengthen the foreign information distribution network. These include domestic transportation libraries and information centers, domestic and foreign online database vendors, foreign document delivery vendors, international associations, and foreign highway and transportation research centers. Information services not currently accessible or available to the general U.S. transportation community were also discussed. Services mentioned include foreign online database vendors, CD-ROM products, translation services, machine translation software products, and foreign document suppliers.

TRANSPORTATION DATABASE PRODUCERS IN EUROPE

The research team visited transportation database producers in Europe to identify technical materials included in their databases and assess their availability in the United States. The research team visited transportation information centers and their supporting document suppliers (i.e., government and research agencies) in England, France, and Germany that provide entries for the Organization for Economic Cooperation and Development's (OECD's) International Road Research Documentation database. The research team also visited the European Conference of Ministers of Transport's (ECMT's) information center which maintains the TRANSDOC database. In addition, the European Space Agency Information Retrieval Service (ESA-IRS) National Center for the United Kingdom (IRS/DIALTECH) was also visited, as well as a consulting firm (François Libman Associés) that is currently developing an international survey on transportation libraries and information centers worldwide.

Information collected from the trip included subject content, volume, and language characteristics of the databases (IRRD and TRANSDOC), as well as identification of the agencies that supply records (bibliographic citations and abstracts) to the information centers. The group also gained an understanding of the flow of this information: from development of the records to data entry and editing, to loading into the mainfile prior to becoming

accessible through the ESA-IRS database. Access to these databases is available only through ESA-IRS, which has not really promoted this product in the United States. The U.S. transportation community has acquired most of the English-language content of these databases through TRIS, which shares information with IRRD; however, the French- and German-language records are available only through ESA-IRS, which can be accessed through the Internet in the United States.

TRANSPORTATION DATABASE PRODUCERS IN JAPAN

The research team visited transportation database producers in Japan. The team members held meetings with government and quasi-governmental agencies that produce and maintain transportation databases. The Public Works Research Institute (PWRI) (a department of the Ministry of Construction) submits records (in English) to the IRRD database, but at this time, only a few records have been submitted. Most of the other transportation database producers are not creating records in English, and access to these databases is available only in Japan. The Japanese Government determines what material will be translated into English. A limited number of Japanese civil engineering records are accessible in the United States through STN International, a private company.

AUSTRALIAN TRANSPORTATION INFORMATION

The Australian Road Research Board (ARRB) produces the ROAD database, which contains all significant highway and road transportation documents and other information produced in Australia. Only a selection of the records in ROAD is sent to the IRRD database. The ROAD database is available in the United States through the National Library of Australia's OZLINE. The ROAD database is also available for searching on CD-ROM at the Institute for Transportation Studies Library, University of California at Berkeley.

CITATION AND DOCUMENT ACQUISITION ANALYSIS OF FOREIGN HIGHWAY INFORMATION IDENTIFIED IN FOREIGN AND DOMESTIC DATABASES

As part of the study, the project team conducted a citation and document acquisition analysis to determine the availability of foreign documents accessed through the five largest databases containing transportation information (TRIS, NTIS, COMPENDEX, IRRD, and TRANSDOC). Using the keyword "highway" and index fields non-U.S. or non-English language, 50 records were identified and pulled off each of these databases. For each record, the library staff of Northwestern University's Transportation Library identified the location of the full text of the document, then estimated the time for delivery and acquisition costs. The team was found that records from COMPENDEX were cheaper to obtain than those from any other database. Document delivery time ranged from 10 days to approximately 2 weeks for the domestically available databases (NTIS, COMPENDEX, and TRIS) and approximately 4 weeks for the foreign databases (TRANSDOC and IRRD).

Domestic sources with foreign records available were NTIS (100 percent), COMPENDEX (100 percent), TRIS (51 percent), IRRD (49 percent), and TRANSDOC (36 percent).

RECOMMENDATIONS

Recommendations were based on study findings and analysis from the task reports and the citation and document acquisition analysis. Recommendations (based on findings) to strengthen the foreign and domestic information needs of the U.S. transportation community include the following:

- Improve access to information resources by developing a national transportation library system, establishing a national information access policy, and allocating resources to promote use of foreign and domestic transportation information databases.

- Provide education and training to U.S. highway practitioners to identify and acquire foreign and domestic information resources.

- Conduct periodic international conferences for transportation information providers and users and highway engineers.

- Develop national transportation information links connecting catalogs and databases from different libraries and information centers into one network.

- Provide better access to translation services to promote an increase in the acquisition of foreign-language information and documents relevant to transportation topics. Investigate machine-translation products as well.

- Provide resources for TRIS to include translations of foreign-language records and produce current awareness products (bibliographies and abstracts) on foreign-based documents and specific topics. Examine TRIS' practice of including foreign-based records as well.

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INTRODUCTION AND PROJECT OBJECTIVES

The principal goal of this project was to provide the Federal Highway Administration (FHWA) with specific suggestions and costs for improving the acquisition and dissemination of technical materials from abroad.[1] The flow of information to the United States was examined because foreign transportation literature is often inaccessible and online information databases often lack coverage in current research, policies, standards, and procedures. Recommendations to increase the accessibility of transportation information were prepared in order to provide the U.S. transportation community with information and knowledge on recent technology and trends worldwide.

To meet the objectives of the project, the group performed the following tasks:

- identification and assessment of the U.S. transportation community's needs for foreign technical information;
- analysis of the means by which foreign technical materials are currently made available;
- inventory of the technical materials produced by foreign transportation organizations and their availability to the U.S. transportation community; and
- preparation of a list of recommendations and costs for improving the means of acquiring and disseminating foreign technical materials to the U.S. transportation community, especially materials that elucidate the most current technology and research developments from foreign sources (especially state-of-the-practice, research-in-progress, procedures and policies, and directories of accessible technical experts worldwide).

Four tasks were performed to realize project objectives.

In Task A, the contractor and team partners attended a kickoff meeting with the Government personnel responsible for managing and reviewing the project to discuss the detailed written action plan. Comments from the Government were included in a revised work plan.

In Task B, a survey instrument was developed and administered to key representatives of the FHWA and affiliated professional organizations and societies. The survey instrument, sample size, procedures, and analysis methods were reviewed by the Government before the survey was implemented. Results of the survey, tabulations, and analysis were presented to the Government in a draft report. The Government commented on the draft; KETRON revised the report and delivered final survey findings. The findings are included in this Final Report.

In Task C1, the contractor analyzed the existing information transfer channels and media used. Services of interest, not currently available to the U.S. transportation community were identified. The contractor's analysis included reviewing the results of the survey, corresponding with major library and information centers, and conducting both online and manual literature searches for relevant sources that would address topics related to this task. A draft report was sent to the Government for review.

In Task C2, the contractor visited the foreign transportation information centers in Europe and Japan to assemble an inventory of the technical materials produced by foreign transportation organizations and to assess their availability to the U.S. transportation community. Meetings were held with the Organization for Economic Cooperation and Development's (OECD's) International Road Research Documentation (IRRD) Coordination Centers in England, France, and Germany; the European Conference of the Ministers of Transport (ECMT's) TRANSDOC Coordination Center in France; and various transportation information centers sponsored by the Japanese Government and professional and private (nonprofit) organizations. Two draft reports (on Europe and Japan) were sent to the Government for review.

This Final Report (Task D) provides the findings and recommendations from the other tasks.

Recommendations are as follows:

1. Provide information services that are needed but not currently provided.

2. Describe how to improve existing services so that they would reach the most users.

3. Analyze the options for closing the gap between the existing system and user needs.

4. Estimate implementation costs for suggested options.

TASK B: (SURVEY) SUMMARY AND ANALYSIS OF FINDINGS

BACKGROUND

The objective of the survey was to determine user transportation community) needs for foreign technical information by surveying:

- employees of the U.S. Department of Transportation (U.S.DOT) FHWA;
- employees of the U.S.DOT Research and Special Programs Administration (RSPA); and
- nongovernment representatives of transportation associations and organizations.

The Federal Highway Administration and Research and Special Programs Administration employees represented different disciplines and levels of responsibility (including those who develop policy and regulations and those responsible for implementation in such areas as legal issues, construction, design, maintenance, planning, and environmental issues). Federal Highway Administration and Research and Special Programs Administration employees included the directors of information gatherers in each of the FHWA program offices (including the Federal Lands Highway Office and the Federal Aid Region and Division Offices), the Research and Special Programs Administration program offices of Research Policy and Technology Transfer, the University of Research and Education, the Transportation Safety Institute, and the Volpe National Transportation Systems Center (see Table 1).

The nongovernment representatives selected for the survey included the key information gatherers from the following nine agencies or organizations:

- American Association of State Highway and Transportation Officials (AASHTO);
- American Consulting Engineers Council (ACEC);
- American Public Works Association (APWA);
- American Society of Civil Engineers (ASCE);
- Associated General Contractors of America (AGCA);
- Institute of Transportation Engineers (ITE);
- American Road and Transportation Builders Association (ARTBA);
- Special Libraries Association (SLA), Transportation Division; and
- Transportation Research Board (TRB).

Table 1. Federal Highway Administration Participating Departments

Program Area	# of Participants
Office of Program Review	1
Associate Administrator for Policy	1
Office of International Programs	9
Office of Policy Development	14
Office of Highway Information Management	1
Associate Administrator for Research and Development	2
National Highway Institute	3
Office of Engineering and Highway Operations Research and Development	4
Office of Safety and Traffic Operations Research and Development	3
Office of Research and Development Operations and Support	1
Office of Advanced Research	3
Associate Administrator for Program Development	1
Office of Engineering	12
Office of Environment and Planning	5
Office of Right-of-Way	1
Associate Administrator for Safety and System Applications	1
Office of Highway Safety	5
Office of Traffic Management and Intelligent Vehicle/Highway Systems	5
Office of Technology Applications	10
Office of Personnel and Training	1
Office of Management Systems	2
Associate Administrator for Motor Carriers	1
Office of Motor Carrier Information Management and Analysis	2
Office of Motor Carrier Standards	2
Office of Program Management Support	1
Office of Motor Carrier Safety Field Operations	2
Federal-Aid Region Offices	17
Division Offices	8
Federal Lands Highway Office	1

The survey objectives were as follows:

1. Assess requirements for timely information and determine user needs in terms of subject areas and services not being provided (such as translations).

2. Determine the user community's primary subject interests (for example, intelligent vehicle/highway systems, contract administration, materials, motor carriers, construction), and describe user needs and interests.

3. Determine the types of services that users want (for example, translations, quick access to bibliographic data, abstracts, and full-text documents).

4. Determine whether users are sufficiently aware of information services.

TOPIC AND CONTENT OF SURVEY

The survey was designed to collect three categories of information from participants: Background of Respondent, Current Methods of Obtaining Information, and Foreign Information Needs. Under each category, the following topics were developed:

Background of Respondent

- Program Area or Organization
- Type of Information User
- Primary Job Responsibility
- Staff Size and Budget Limitations
- Technical Areas of Interest
- Travel and Language Characteristics

Current Methods of Obtaining Information

- Sources of Information
- Abstracting and Indexing (A&I) Services
- Frequency of A&I Service Use
- Printed Sources of Information Request Types
- Methods of Current Awareness
- Information and Documentation Acquisition Methods

Foreign Information Needs

- Importance of Foreign Information
- Awareness of Foreign Information Services
- Source Countries
- Frequency of Foreign Information and Document Requests
- Foreign Subscriptions
- Type of Medium and Timeliness of Document Delivery
- Technical Areas of Interest
- Frequency of A&I Service Use
- Problems of A&I Service
- Types of Services (e.g., Full-Document Translation or Abstract Translation)
- Frequency of Translation Requests and Source of Translation
- Reasons for Rejecting Foreign Information
- Other Issues

Responses from the three categories of questions were matched and cross-tabulated to meet the survey objectives.

DEVELOPMENT AND IMPLEMENTATION OF SURVEY

The development of the survey involved the following steps:

- Prepare topics for survey.

- Submit first draft of survey for review by contracting officer's technical representative (COTR) and review committee.
- Revise survey.
- Conduct pilot survey (on diskette and hard copy) with COTR, select committee members, and FHWA staff.
- Revise survey based on pilot testing comments.
- Submit final, revised survey to COTR for approval.
- Incorporate final revisions to survey, participant list, and cooperation letter.
- Mail survey and cooperation letter.

The survey topics were prepared during the proposal effort and then presented informally to the COTR and review committee during the project kickoff meeting (October 1993). The COTR and review committee made comments and suggestions at the meeting. Through follow-up telephone and letter correspondence, the draft was revised, translated into a computer file using a software program for survey design, and sent on diskette to the COTR, select review committee members, and FHWA staff. Final revisions were based on comments received from the pilot survey. The survey (on diskette) and accompanying letter and instructions were mailed to the participants in mid-December 1993.

In late January 1994, the COTR sent E-mail reminders to the Federal Highway Administration (headquarters) participants who had not responded. The contractor sent reminders to the FHWA regional and division participants. (The survey time period was extended for three weeks because of the inclement weather and icy road conditions hampering the Washington, DC, area in January.) By early March 1994, the responses of 105 participants had been analyzed (79 percent of the surveys mailed out). The number of respondents for each of the four groups was as follows:

Number of respondents per group:

Federal Highway Administration headquarters[1]	73 out of 99 (74%)
Federal Highway Administration region	17 out of 17 (100%)
Federal Highway Administration division	8 out of 8 (100%)
Nongovernment	7 out of 9 (77%)
	105 out of 133 (79%)

2 Includes Research and Special Programs Administration and Bureau of Transportation and Statistics.

ANALYSIS OF SURVEY FINDINGS

The analysis and interpretation of the results of the survey include an overall summary and interpretation of the findings. The following contract objectives were also addressed:

- Determine user community's primary subject interests and describe user needs and interests.
- Determine types of service that users want, for example, translations, quick access to bibliographic data, abstracts, and full-text documents.
- Determine whether users are sufficiently aware of information services.

The summary is presented in the following sections: Background, Current Methods of Obtaining Information, and Current Methods of Obtaining Foreign Transportation Information and Determining Foreign Information Needs.

Background

Participants from all of the FHWA program areas and regional and division offices were represented in the survey to provide a broad interdepartmental view of foreign information needs and awareness. In addition, a selection of nongovernment associations and research organizations that specialize in transportation were also included to get an idea of their foreign information needs and awareness and to determine how their needs differ from those of the FHWA.

Participants were mostly technical information gatherers and end users[2] of transportation information; for the most part, they were not primarily involved in research and development alone. Thus, the sample represented FHWA and nongovernment individuals who probably use foreign technical information for general, routine work assignments and not necessarily for specific research projects. This group offered an appropriate sample for the survey.

Responses to questions about budget limitations and availability of staff to conduct information gathering and acquisition activities showed that participants felt that more staff and budget should be used for these activities. However, if they were to be asked the same questions about other work activities, participants might give similar responses (e.g., "there is always a need for more staff and budget for any work activity").

Over half of the FHWA participants represented the program areas of technology transfer, traffic operations and safety, planning and administration, and highway design, groups that certainly need access to foreign technological developments.

With respect to foreign business travel and language capabilities in-house, the results showed that FHWA headquarters staff (and nongovernment associations and organizations) periodically travel outside the United States. In addition, these groups have multilingual staffs. The predominant foreign language is Spanish. French and German were also well represented. Thus, obtaining information in these three languages may not be too difficult if it is important information and translation services are readily available or economical.

Current Methods of Obtaining Information

For FHWA participants, attending conferences, trade shows, and professional society meetings, plus maintaining internal communications were the primary methods of obtaining information. Research reports and government publications was also important sources of information. Even though it is worthwhile to attend professional conferences, trade shows, and meetings, and much current technological information can be obtained at these events, the lack of importance of online literature searching and document acquisition services as a "source of information" choice is a concern, especially from an economic standpoint. Online information searching in an office is more efficient, more comprehensive, and certainly more cost-effective than time spent at conferences with their associated costs (e.g., travel, lodging).

Fewer than 30 percent of the FHWA respondents listed online information database services as important; for the most part, those who responded that they use these services mentioned TRIS, the transportation database produced by the Transportation Research Board. However, more effective online information searches should include additional databases (e.g., NTIS, COMPENDEX, IRRD, and TRANSDOC). Thus, FHWA respondents do seem to need to learn more about conducting comprehensive online information searches.

For printed material used regularly, all participants responded that "everyday reference material, government reports and publications, and journals" were their top choices. However, current awareness services, usually known as selective dissemination of information (SDI) services, are readily available in hard copy, at relatively low cost, and would complement their current materials. (They can also conduct their own SDI searches online.)

For obtaining information, most of the participants relied on their own reference collections, in-house library, and electronic mail. Online information and document acquisition services were not selected as their primary choices. There are numerous online document delivery vendors, national and international. Thus, lack of knowledge or awareness of these services and economical constraints may be limiting the use of these services, which are quite effective for obtaining information and documents.

Current Methods of Obtaining Foreign Transportation Information and Determining Foreign Information Needs

As evident from the majority of participant responses, knowledge about foreign developments in highway transportation technology and research is important, even more so for FHWA headquarters and the nongovernment participants than for FHWA regional and division respondents, but nevertheless quite important for all.

To identify foreign developments in transportation technology and research, participants use the same methods they use to meet their regular information needs: attendance at conferences, trade shows, professional societies; research reports and government publications; and journals. Online database searching is not included as an important method of obtaining information.

With respect to foreign contacts used by participants to identify foreign developments in highway transportation

technology and research, the most important contacts were from other governments, private industry and corporations, and academic institutions. These choices should be expected, because most research and technological developments originate from government and the private sector. The participants are going to the right sources.

The use of abstracting and indexing services to identify foreign developments in transportation technology and research is relatively low (similar to the response given for current information use). Participants seem to lack awareness of the value of using abstracting and indexing services for identifying foreign information.

When abstracting and indexing online services are used to identify foreign information, the majority of the participants were somewhat dissatisfied with the services, due to inadequate citations and abstracts and the unavailability of abstracts in English. In addition, when ordering documents online, problems cited by participants included lack of document ordering information, inadequate bibliographic citations, and lack of abstracts in English (useful for identifying the document's importance). Databases will always have incomplete information. Thus, being aware of more transportation subject databases (especially foreign ones) will increase the likelihood of identifying a higher percentage of appropriate information.

Of great interest is that although the FHWA headquarters participants regularly request foreign information, they do not do so as frequently as the nongovernment sector.

Also highly interesting is that one-third of the foreign documents are obtainable domestically. This availability suggests that U.S. transportation libraries are able to meet some of the document acquisition needs.

Most foreign documents ordered came from the technologically advanced countries of Western Europe, Canada, and England. Japan was not the top choice of any of the participant groups. Language barriers and, possibly, limited awareness of bibliographic material in online databases may be among the problems anticipated or encountered in ordering Japanese documents.

Most of the foreign documents chosen by all groups were government and private research reports, journals, and conference proceedings, primary sources of information.

Most participants also reported the average length of time for foreign document delivery as more than two weeks, and 40 percent responded that it was more than 1 month. This lag time can be a problem for most of the U.S. transportation community, which wants hard copies of documents within a relatively short time (such as one week). Direct access to foreign document suppliers may reduce the delivery lag.

Only about one-third of the FHWA participants reported subscriptions (or having access) to foreign periodicals or standing orders for reports. Foreign subscriptions are costly; it is somewhat surprising, therefore, that the number is this high. This percentage supports early responses that access to foreign information is very important.

Nongovernment participants had a much higher level of foreign subscriptions than the FHWA, which is perhaps related to fewer cost barriers for nongovernment participants. A national union list of foreign and domestic transportation serials may be of some use.

A major finding of the survey was that approximately 90 percent of participants responded that they were not aware of foreign abstracting and indexing services or foreign information sources that could enhance their work. Not knowing that these exist is a major obstacle to an awareness of foreign technical information; there are several very important transportation information abstracting and indexing services that should be used.

On average, relatively few documents have been ordered by the FHWA participants; many more have been ordered by the nongovernment participants. For the most part, these foreign documents were in English. For the relatively few foreign-published documents ordered by FHWA participants (20 percent), around half required translation, and approximately half of those could be translated in-house. The survey revealed a relatively small number of foreign documents ordered by FHWA participants. In addition, the participants primarily ordered English-language documents, or foreign-language documents when in-house translators were available. Thus, the results suggest that FHWA participants tend to avoid documents in other languages. Nongovernment participants reported much more extensive acquisition of foreign documents, and they have these documents translated outside. Since foreign document acquisition and translation services are costly, perhaps more funding resources are available to the nongovernment group.

For the most part, all participants agreed on the importance of using foreign abstracting and indexing information and document acquisition (including translation) to improve the ability to identify and obtain foreign technical information.

Task Objectives

One of the survey's objectives was to determine the user community's primary subject interests and describe user needs and interests.

The intent of the survey was to reach as many different FHWA program areas and regional and division offices as possible, as well as a broad range of nongovernment transportation organizations.

The sample of participants selected for the survey reflected an attempt to reach the information gatherers and end-users of information in each FHWA program area. No attempt was made to identify candidate participants based on statistically sound random sampling methods. In addition, the COTR identified a percentage of candidates based on participants' information needs.

When the surveys were counted, 92 FHWA headquarters and regional and division program area participants sent properly completed surveys. More than half of the FHWA participants were primarily interested in technology transfer, traffic operations and safety, planning and administration, and highway design. Secondary interests were in the same areas, but also included engineering and highway operations, as well as management systems (e.g., bridges, pavements). Thus, responses to user (foreign) information needs and awareness reflect these areas of interest for at least

half of all FHWA responses. The following seven nongovernment organizations (with one participant each) also responded: TRB, SLA (Transportation Division), AASHTO, ACEC, AGCA, ITE, and ARTBA. Their responses are based on their needs in the context of their work and organization's interests.

The results of the survey from an information-science viewpoint (specializing in transportation information) suggest a general lack of awareness and use of abstracting and indexing information services, both domestic and foreign, especially foreign. It is important to attend conferences (the choice selected by most participants) and read research reports and journals to keep up with current awareness (participants indicated that the majority of information identified and obtained is through in-house personal collections). However, from an economic (and comprehensiveness of information) standpoint, periodic screening of topics of interest, either in online databases (or through hard copies of abstracts) or through an SDI service, is essential.

Those participants who were using online database services were primarily using TRIS (maintained by the Transportation Research Board, U.S. Department of Transportation). Transportation libraries typically conduct more comprehensive searches, often including: NTIS (U.S. Department of Commerce); COMPENDEX (Engineering Index, Inc.); Psychological Abstracts (American Psychological Association); and several other trade, industry, magazine, and news databases. There is a need, in the FHWA and U.S. transportation community, for greater awareness of other databases that include highway and transportation information, as well as online database searching services, such as those provided by libraries and information centers. Resources should be allocated to provide U.S. highway practitioners and State DOT libraries with increased and better access to online transportation databases.

Participants acknowledged that foreign information is important to them and that they rely on foreign contacts to identify information abroad. The majority of contacts for the FHWA participants come from government sources, private industry, and academic institutions. These primary sources of information should continue to be used for current awareness. Thus, all efforts to promote the use of these foreign contacts should be continued, and the network of foreign contacts should be expanded by creating a directory (possibly arranged by subject area) for use by all FHWA program areas.

FHWA participants are ordering foreign documents about once a month, mostly from U.S. sources. The FHWA regional and division participants rarely order foreign documents. The nongovernment participants order almost 100 foreign documents per year each. The difference between the FHWA and nongovernment participants is tremendous. It may be related not to interests, but to economics. Ordering foreign documents from Europe and Canada (and having translation services performed) can be expensive.

The FHWA participants are most interested in obtaining foreign government reports and publications, plus journals and conference proceedings. Most of these documents can be easily obtained through foreign libraries (such as the British Library), document delivery vendors (such as the Institut de l'Information Scientifique et Technique in Paris), and subscription service companies. Interdepartment

sharing of foreign subscriptions is probably needed in the FHWA.

Participants are primarily interested in English-language foreign documents. Reducing language barriers (such as providing an easier mechanism for translation) may increase foreign document acquisition. All participants have expressed an interest in and need for more awareness of foreign abstracting and indexing services to identify foreign information and to obtain documents, as well as of translation services.

Improving access to foreign (and domestic) resources of information could be achieved by developing a national transportation library system, which would provide services to the public, academic, and private sectors of the U.S. highway community.

Another survey objective was to determine the types of service that users wanted.

Results of the survey showed a need for foreign document acquisition and serial publication services in the U.S. transportation community. Obtaining government reports and publications, as well as journals and conference proceedings, was the top priority. With government budgets shrinking, the ability to attend conferences (the predominant first choice of respondents for current awareness) may diminish. The need exists to provide transportation libraries with funding resources to build foreign collections as well as to create national transportation information links connecting catalogs and databases from different libraries into one network. With this in place, highway practitioners will have the ability to easily access foreign (and domestic) information available in the United States.

Foreign government and industry contacts are very important. Establishing a network connecting these foreign contacts with the transportation community might enhance current awareness. At present, the Permanent International Association of Road Congress (PIARC) is establishing a global exchange of road-related information and knowledge through the use of national, regional, and global networks (INTERCHANGE), which will put people with road-related problems in touch with experts.

There is a need for document translation across FHWA program areas. Lack of translation services may be a major restricting factor in the foreign document acquisition process. An in-house service may be cost-effective by reducing the reluctance to obtain possibly important foreign-language transportation documents. As a supplement, contractors should also be used to provide translations. In addition, funds should be allocated to purchase software that can provide rough translations of citations, and possibly full texts. Resources should also be allocated to TRIS to provide translations of all foreign-language records sent to them by foreign databases.

Even though participants expressed the need for online full-text documents and machine translation services, this technology is relatively new. Database vendors that supply transportation information have only begun to address this issue. For now, awareness of document acquisition vendors and institutions will have to suffice.

Another survey objective was to determine whether users are sufficiently aware of information services.

The majority of participants did not select

abstracting and indexing services as their primary method of identifying information (domestic or foreign) and need to be more aware of the value of these services (especially foreign), as well as CD products that contain offline versions of these databases.

Participants also reported that one of their problems is a lack of awareness of vendors and institutions that offer document-ordering services. This problem prevents them from ordering foreign documents. U.S. transportation libraries need to promote the listings of their holdings of foreign serials. (Some of these collections can be searched through the Internet.)

Database vendors should also supply listings of foreign journals scanned. A reference guide to foreign document-delivery vendors is also needed.

Directories of translation services should also be available to the FHWA and U.S. transportation community. These directories should include cost per document or per page or per word, amount of time for delivery, and languages available.

One of the products of this project will be a reference handbook to help the FHWA and transportation community identify foreign information sources and contacts. This handbook will be under separate cover.

TASK C1: ANALYSIS OF EXISTING TRANSPORTATION INFORMATION DISTRIBUTION NETWORK

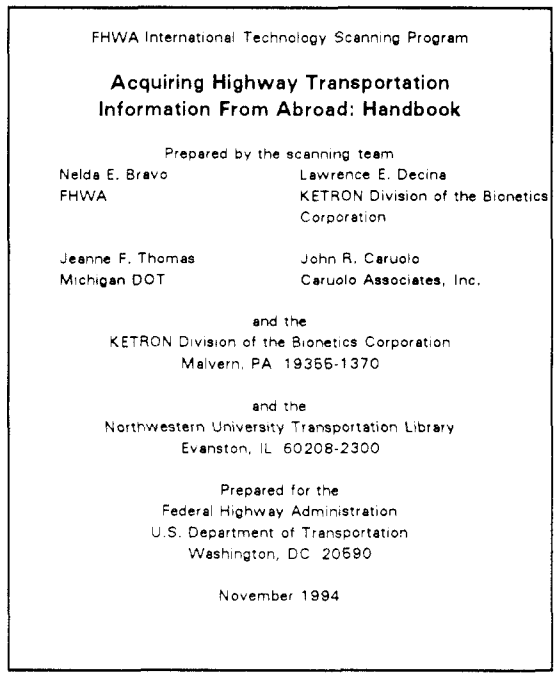
BACKGROUND

The objectives of Task C1 were to analyze the methods used to make foreign technical materials available to the U.S. highway practitioner, and then to identify the services necessary to improve the information distribution network. The report described the information transfer channels and media currently used by highway practitioners to gather foreign information and the information sources that should be used to a greater extent, and identified services that are of interest but are not easily accessible or currently available.

The report was prepared from the following information sources:

- results of the survey;
- review of current methods of identifying and accessing domestic and foreign transportation information services (including information from a recent online literature search in transportation and information science databases);
- correspondence and personal communication with librarians who manage national highway and transportation libraries and information centers; and
- review of findings from the transportation information database centers and contributors to these databases in Europe and Japan.

The main content of the report will be included in the project's handbook (under separate cover).



FHWA International Technology Scanning Program

Acquiring Highway Transportation Information From Abroad: Handbook

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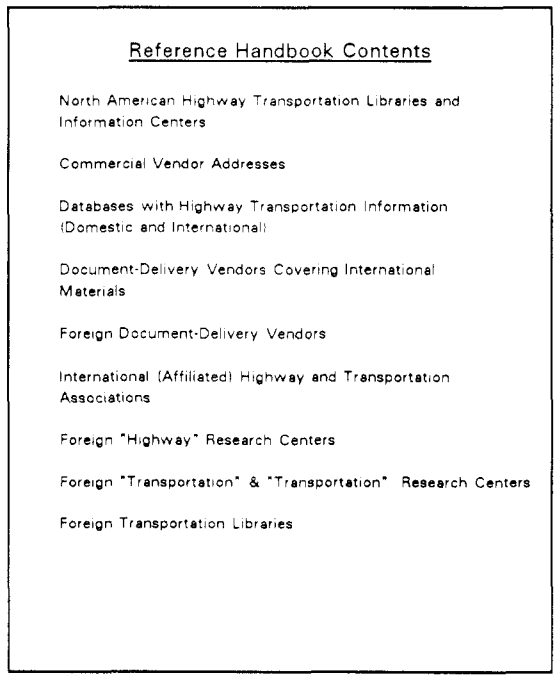
November 1994



Reference Handbook Contents

North American Highway Transportation Libraries and Information Centers

Commercial Vendor Addresses

Databases with Highway Transportation Information (Domestic and International)

Document-Delivery Vendors Covering International Materials

Foreign Document-Delivery Vendors

International (Affiliated) Highway and Transportation Associations

Foreign "Highway" Research Centers

Foreign "Transportation" & "Transportation" Research Centers

Foreign Transportation Libraries

CURRENT TECHNIQUES FOR GATHERING FOREIGN INFORMATION

Results of the survey showed that the transportation community primarily uses the following information channels and media to identify and obtain foreign transportation information:

- conferences, trade shows, professional societies, and related activities;
- research reports and government publications; and
- periodicals, journals, conference proceedings, trade magazines, newspapers and newsletters, and similar publications.

There was also reliance on foreign contacts in government and industry.

Fewer than 5 percent of the respondents relied on online or hard-copy abstracting and indexing services. In fact, most of the respondents were not even aware of any foreign databases. Of those who were aware of these foreign databases, most lacked information on how to access them.

Survey respondents also reported that they obtain most of their foreign documents from Western Europe, Canada, and England. International Road Federation (IRF) and Organization for Economic Cooperation and Development (OECD) publications were cited as documents often obtained by respondents.

Approximately 81 percent of the foreign documents ordered were in English. However, of those documents that required translation, about half were translated by an outside translation service (most of the others were translated by in-house staff).

In addition, approximately 35 percent of the transportation community responded that they subscribe to foreign periodicals.

HIGHWAY INFORMATION SOURCES

In the fields of highway and transportation engineering and research, the ability to identify and acquire information and technical material and documents (e.g., journal articles, research reports, conference proceedings, standards, regulations, rules) domestically and especially internationally can require special education, training, and the skill that comes with experience in and around a library setting. However, the survey revealed that many of the respondents conducted their own information-gathering activities. Thus, it was thought appropriate to present information covering important sources that can be used by highway transportation engineers, researchers, and others in identifying and accessing information in the field.

Library and Information Centers

The primary sources that should be used by the transportation community in identifying and obtaining domestic and foreign material are academic, government, and other libraries and information centers that specialize in the field. There are approximately 200 transportation libraries and information centers in the U.S. and Canada; more than 20 of these libraries and information centers specialize in highways, traffic engineering, and safety.[3] (Most of the State, public, and academic libraries and information centers are open to the public by appointment and for on-site use only.) State department of transportation libraries are not always open to the public.

Academic institutions provide lending services for a fee.

Librarians and information specialists who are employed by these institutions (and other libraries in general) help highway engineers or researchers in meeting their information needs by determining appropriate subject databases, serial lists, directories, professional organizations, and regulations and standards or patent offices.

Recent correspondence with several librarians from some of the most highly regarded and used transportation libraries (Institute of Transportation Studies Library, University of California – Berkeley; Transportation Library, Northwestern University; Transportation Research Board Library; Texas Transportation Institute Library; Transportation Research Institute Library, University of Michigan; Transportation Employees Library, Pennsylvania Department of Transportation; and Michigan Department of Transportation Resource Center and Library) revealed how they identify and obtain foreign information and documents to meet the needs of their transportation community clients. These librarians were questioned about types of foreign material obtained, methods of obtaining material, services and sources used to obtain material, and the unique services that the libraries offer in assisting the highway community. A summary of this correspondence follows.

Library staff were asked for the "types of foreign transportation information documents routinely obtained." As suspected, only a small percentage of the transportation serials that these libraries subscribe to are foreign. These libraries reported having subscriptions to approximately a dozen to two dozen foreign transportation journals. Their holdings primarily included journals, conference proceedings, books, and research reports. There was no mention of standards and regulation-type documents. The transportation libraries of the University of Michigan, Northwestern University, and the University of California – Berkeley appear to have the largest transportation-specific foreign document collections.

Identifying whether a library has a foreign journal or report can be accomplished by searching the card catalog, online catalog, or serial listing of the library. Assistance is usually provided by a reference librarian or interlibrary loan department staff member. If a library does not hold the item, searches can be performed either by the patron or the staff member on other databases to determine whether the document is owned by another library. Some of the databases checked would be local area online library catalogs (via dialup or Internet), State or regional online catalogs such as Illinet Online, out-of-State online library catalogs (via Internet), and bibliographic databases such as OCLC[4] or Research Library Information Network. The last two systems can identify what library in what geographic area holds a specific document. More than 50 transportation libraries currently subscribe to OCLC. Interlibrary loan by mail, fax, or onsite can usually provide the requestor with a hard copy of the document.

The librarians were also asked about "methods of obtaining foreign transportation documents." Their most commonly used methods of obtaining foreign transportation documents are through standard subscription (including the use of subscription service companies) and exchange agreements with foreign organizations. Frequently used foreign subscription services include Harrassowitz

(European, especially German); Dawson (European, especially British); Livres Etrangers (European, including Russian); Ebsco-Bennett (Australian); Faxon (French, Canadian, Japanese); Lindsay and Horves (British); Nijhoff (European); and Hoppenstedt (international book and serials dealer).

The library personnel mentioned that they also place direct requests (usually by fax or by purchase orders) to the issuing agencies (document publishers), associations, organizations, and academic institutions for specific requests from patrons. This method is extremely time-consuming. In some cases, when libraries cooperate through interlibrary loan agreements, arrangements for book loans and copies can be expedited, and at low or no cost.

Librarians were also asked about the "unique services offered by libraries to assist patrons in identifying and acquiring foreign transportation documents." These libraries provide services that are not readily available to government and private firms conducting research. For instance, the OCLC system is a very important national system that can provide information on where to find any document that is catalogued in almost every public, academic, and government library in the United States. The OCLC system is not readily available (most subscribers are libraries) or affordable to many individuals. This service provides access to a national computerized card catalog system. Identifying the location of a particular document anywhere in the nation takes only seconds. Interlibrary loan service (providing a means to lend documents from one library to another by mail) requires specialized forms (American Library Association [ALA] format) that, for the most part, only libraries use and sanction in exchanges with other libraries. The individual highway engineer, who is probably not affiliated with a library nor has an ALA membership, may have difficulty in borrowing a document from a library directly. Placing a request through an interlibrary loan department is probably the best alternative.

Library staff often use online database vendors. Many of the academic and State libraries access transportation information sources through online vendors. However, these libraries have limited budgets and charge a fee for conducting searches.

Online Information and Literature Databases

One of the most important tools available to transportation information users is computerized and online databases. Online information and literature searching and online document acquisition are relatively straightforward, and most individuals can easily conduct searches within a day of training. Accounts are opened with commercial vendors, which often charge startup and annual fees. Upon opening an account, users are given passwords. Once an account and password are obtained and training has been received to understand the search commands and processes, conducting a search can begin. The user should select appropriate subject databases and formulate a search strategy before beginning the search. Many transportation information users let information professionals conduct the search because of their experience working in the database as well as their expertise in search strategies and database commands. Most often, the user will give the information professional (who is knowledgeable in the subject matter) the search terms, or they will develop the terms jointly. Because the information

professional is familiar with online database systems, that person can usually conduct the search in a more efficient and cost-effective manner than the user can. Commercial vendors that provide access to databases containing domestic and foreign scientific and technical material related to highway and transportation topics include BRS, CISTI, DATA-STAR, DIALOG, ESA/IRS, ORBIT, STN, and Newsnet.

A popular vendor in the United States is DIALOG Information Services, Inc., which contains several hundred databases. Several databases in DIALOG have information and literature on transportation topics. The most commonly used databases include TRIS (Transportation Research Board); NTIS (U.S. Department of Commerce); COMPENDEX (Engineering Information, Inc.); PSYCHINFO (American Psychological Association); ERIC (U.S. Department of Education); Thomas Register Online (Thomas Publishing Co.); Standards and Specifications (National Standards Association); IHS International Standards and Specifications (Information Handling Services); Newsearch (Information Access Company); and Trade and Industry (Information Access Company). Other subject databases in DIALOG are also commonly used to provide information on standards and patents, dissertations, news and other current event topics, and product and company information. Many of these databases have international coverage.

The vendor ESA-IRS provides a very good source for accessing foreign highway transportation information. The following databases in ESA-IRS contain relevant information: IRRD (Organization for Economic Cooperation and Development, France); TRANSDOC (European Conference of Ministers of Transport, France); PASCAL (Institute for Scientific and Technical Information, France); and ACOMPLINE/ URBALINE (London Research Center, England).

The vendor STN International provides access in the United States to JICST-E, a database produced by the Japanese Information Center for Science and Technology. This database covers science subjects, including civil engineering topics. However, only seven percent of the database covers the civil engineering field, and only a subset contains highway transportation topics.

Database vendors also provide online access for ordering full texts or hard copies of documents. Document delivery time varies depending on type of document, publication date, and availability. Most documents will be delivered within one to three weeks. However, many documents, especially foreign ones, can take longer.

In DIALOG, document-delivery vendors are identified in the "Yellowsheets," which are contained in the File Content Notebooks DIALOG sends to subscribers. A review of the vendors' description sheets revealed that more than 25 vendors claim that they can provide scientific and technical documents on all topics directly online or through telephone contact. Several of these vendors state that they can acquire documents from anywhere in the world. Others are more specific about particular types of documents and countries.

In ESA-IRS, the online document-delivery vendors that are used for the international transportation databases include the British Library Document Supply Center, INIST Diffusion, Delft University of Technology Library, University of Hanover, and Dynamic Information Corporation.

In STN International, articles and documents from Japanese highway and transportation agencies and organizations can be identified in JICST-E online. A detailed description of these online information and document acquisition vendors is provided in the reference handbook.

Associations, Organizations, and Professional Societies

Establishing foreign contacts or maintaining memberships in international associations and professional societies can provide a means for identifying and establishing sources of foreign information about completed research studies and journal articles, research-in-progress abstracts or factsheets, expert and consultant directories, calendars of conference events, plus past and upcoming standards and regulations. Many associations and societies have libraries with staff to assist in acquiring information. A search in DIALOG's Encyclopedia of Associations (Gale Research, Inc.,
Detroit, MI) database revealed several international associations and societies. The reference handbook provides a list of potentially useful contacts.

Foreign Transportation Research Centers

The survey revealed that the U.S. transportation community does contact foreign agencies to identify and obtain information. Results from the project team visits to Europe and Japan revealed that transportation research agencies with libraries and information centers will respond to information requests from the public, including the U.S. transportation information user. Letter or fax requests are preferred by the non-English-speaking agencies.

An online information search in DIALOG's *Research Centers and Services Directory* (Gale Research, Inc., File 115) revealed more than 40 foreign centers that conduct research or provide services in the field of "highways" and more than 140 foreign centers that conduct research or provide services in the field of "transportation" (nonmarine, air, or rail). Countries represented in the "highway" category are Australia, Canada, China, Denmark, Finland, France, Germany, Ghana, India, Indonesia, Iraq, Ireland, Israel, Japan, Netherlands, Nigeria, Norway, Pakistan, Poland, Portugal, Saudi Arabia, South Africa, Sweden, Turkey, and Yugoslavia. Countries represented in the "transportation" category are Austria, Australia, Brazil, Belgium, Bulgaria, Canada, Denmark, Egypt, Finland, France, Germany, Hungary, India, Indonesia, Israel, Italy, Japan, Jordan, Kuwait, Mexico, Netherlands, Norway, Philippines, Portugal, Romania, Saudi Arabia, Slovakia, South Africa, Spain, Switzerland, Thailand, Turkey, and Zambia. The reference handbook provides a list of the names and addresses of these organizations.

INFORMATION SERVICES NOT YET ACCESSIBLE OR AVAILABLE

The results of the survey showed that the FHWA and other transportation community respondents were very interested in using foreign online databases, translation services, and online machine-translation systems (i.e., translation software used with personal computers and programs used on mainframes); contacting foreign agencies; and using foreign libraries, information centers, and document suppliers. However, the results also showed that the

FHWA respondents did not use a broad range of national online subject databases, were not really aware of foreign online subject database sources, and infrequently ordered foreign documents. Reasons cited were lack of knowledge of what is accessible or available, lack of familiarity with foreign government organizations, language barriers associated with the material, and cost considerations.

To keep abreast of foreign (and even national) transportation technological developments and research in a comprehensive and cost-effective manner, the U.S. transportation community needs to become acquainted with the latest information services and products available. These services and products include access to domestic and foreign online database vendors, CD-ROM products, translation services (e.g., directories of translators and machine-translation software products), and foreign document suppliers, as well as domestic and foreign transportation libraries and information centers.

Online Foreign Database Vendor Access

Most transportation libraries have accounts with domestic vendors (e.g., DIALOG, ORBIT, BRS). The vendor DIALOG can provide access to all transportation subject databases that cover the domestic scene and some international information databases. For a fee (or some other arrangement), interlibrary loan department or reference staff of these transportation libraries can conduct online information and literature searches for the U.S. transportation community. Online database services are available to FHWA staff free through the Transportation Research Board's (TRB's) information staff, which can access TRIS; and through the reference staff of the U.S. Department of Transportation library, which can search a multitude of vendors and databases. This service is also free of charge to FHWA staff. (FHWA field offices can contact the TRB and U.S.DOT libraries by fax or telephone to place requests.)

The availability of foreign database vendors is virtually unknown to the U.S. transportation community, and for good reason. The largest foreign database vendor, ESA-IRS, offers very little advertisement of its availability; in addition, it has no customer representatives or field offices in the United States. A scan of the *Directory of Transportation Libraries and Information Centers in North America* revealed that none of the U.S. transportation libraries even had subscriptions to ESA-IRS. As part of this project, the contractor attempted to acquire an account and password from ESA-IRS. This step was relatively easy. The communication network that connects to ESA-IRS was another matter. If an Internet line (or CompuServe to Internet) is available, access to the system databases can be relatively easy. The contractor had some difficulty accessing ESA-IRS through other communication networks, but was eventually able to get through on a communication network than linked to Internet. Once online, it is easy for the user familiar with database searching languages to conduct a search. The searching language is simple and similar to DIALOG's.

CD-ROM

The use of CD-ROM technology in obtaining transportation information is extremely cost-efficient (especially if the FHWA Local Area Network [LAN] is used) and effective for certain applications, such as comprehensive or state-of-the art

reviews. The price of the CD-ROM disk is far lower than the connect time and print charges that would accrue if the same searches were conducted online. Also, less training would be needed, and there is no cost for the length of time spent on the system. However, CD-ROM products do not replace the ability to access the most up-to-date information, which online access can provide. (To date, most CD-ROM vendors also offer access to online databases as a way to provide the latest information and complement the CD-ROM time coverage.)

Current CD-ROM products contain domestic and foreign transportation information. However, transportation information is not the main subject content of these databases. The U.S. Department of Commerce National Technical Information Service provides a CD-ROM product of the NTIS database that is also available online. In addition, Engineering Information, Inc., provides CD-ROM versions of COMPENDEX, which is also available online. Its products include Ei Civil Disc (information dating back to 1974) and Ei Manufacturing (1984). Both products are updated quarterly.

Toward the early part of 1995, a CD-ROM product that includes TRIS (currently available through DIALOG only) and IRRD and TRANSDOC (both available through ESA-IRS) will be available from SilverPlatter Information, Ltd. of London, England. The product will be called TRANSPORT. This CD-ROM database will provide the most comprehensive domestic and international source for transportation information available in the world. Through informal correspondence with representatives from each of these database producers, it appears that the disk will contain records from the three databases dated no more than three months before the release date, that is, approximately 500,000 bibliographic records produced up to and including June 1994. The single user cost for records from 1968 to the present will be $1,795. A network of five to eight users will cost $3,590. Current information, from the three previous months to the present, will have to be obtained through online searching. At this time, it is uncertain whether online access of the three databases will be available through the same vendor and whether all three can be accessed at the same time (i.e., similar to the multifile searching capability of DIALOG).

TRANSPORT will be available for DOS and Windows platforms in English. (French, German, and Spanish versions of Silverplatter's WinSPIRS are currently in development.) There are plans for a multilingual thesaurus for descriptor-term searching in mid-1995.

Translation Services

Companies and individual consultants that provide translation services are available in every region of the country. Although there is no directory of translation companies, the American Translators Association (ATA)[5] has more than 3,000 members and publishes the semiannual *Translation Services Directory*, which contains a list of over 800 members and their services. Many translators will work on a freelance basis, earning around $300 a day.[6] According to Ms. Helge Gunther, the director of the Delaware Valley Region Group of the ATA, translators usually charge between 8 and 16 cents per word.

Translators can be used in the decision making process of ordering foreign documents. If the transportation

information user identifies bibliographic citations and abstracts in a foreign language, a translator can produce an English-language-version. The user can then make a better decision whether or not to order the foreign document, because that user now has more understandable information about the document. Turnaround time and costs for translation may be issues in considering how practical it is to use contract translation services.

Machine Translation

The concept of using computers to translate documents started in the 1950's when the U.S. Central Intelligence Agency (CIA) invested heavily in a project to develop computer programs that would translate Russian text into English. The project ended in 1966, when the lengthy programs were declared unworkable.[7]

Currently, several software companies produce translation software. Most of the programs target the Spanish-language market, with products costing from $50 to $1,000. These programs provide translations that require subsequent editing. One company has based its software on the technology developed by a CIA-funded project in the 1960s. It provides PC-based translation software for conversions from German, French, Spanish, and Russian to English. Each translation system is one-way. Each program needs about 12MB of hard-disk space and is distributed on either 5.25- or 3.5-inch disks. The software works with any word processor capable of generating an ASCII file. The software can be used with DOS (2.0, 3.0), Windows (2.0), Macintosh (2.0, 4.0), OS/2 (4.0), and UNIX (4.0) platforms. Printed documents can be easily scanned by an optical character recognition program. Despite the accuracy of these programs, they still require editing, especially if the documents are to be published. (One reason is related to idiomatic expressions, which do not always have an equivalent in another language.) These software programs cost about $600.

These machine-translation products can greatly increase the ability of the U.S. transportation community to identify and order foreign-language documents, at least in the languages available. After initial purchase of the software, there is relatively little translation cost. The software can be used either for translating bibliographic citations and abstracts identified in an online database search (these records can be downloaded into a file) or for translating full-text foreign-language documents directly (an optical character recognition scanner converts print to an ASCII text file). Even though a perfect translation may result, the ability to understand the main concepts of the information may be enough to let a user decide whether to order the full text of the document or finish translating a full-text document.

Foreign Document Suppliers

The survey revealed that respondents are not really aware of where to order foreign documents. A vendor directory describing availability of documents by subject and media type would be useful for transportation information user. Because many documents are identified without using online systems, the user needs to contact document suppliers directly. These suppliers usually have full-time staff ready to handle inquiries on document delivery. A list of the names and addresses of foreign document-delivery suppliers is presented in the reference handbook.

TASK C2A: SUMMARY OF VISIT TO TRANSPORTATION INFORMATION CENTERS IN EUROPE

OBJECTIVES

The objective of Task C2a was to conduct an inventory of the technical materials produced by foreign transportation organizations and to assess their availability in the U.S. transportation community. To accomplish this objective, the project team and COTR visited transportation information centers in England, France, and Germany that supply entries for the OECD's IRRD database. In the spring of 1994, the team conducted a comprehensive investigation to understand how the database is built and maintained, how information is collected and by whom, and what criteria are used for information selection and translation. The team also investigated the indexing and thesaurus arrangements of the IRRD, as well as the document suppliers and vendors for the database. In addition, other highway transportation information centers, database suppliers (such as the ECMT), and companies were visited to learn about the other transportation information sources and document suppliers that are accessible from Europe and the rest of the world.

Specific task objectives included:

- determining the percentage of publications or abstracts translated into English, the criteria used by the publishing agency to select items for translation, and the lag time in making translated materials available to the public;
- comparing the number and type of technical materials produced in developed countries with those actually available in the United States; and
- identifying the procedures for acquiring technical materials developed abroad, for individuals as well as libraries and special collections.

ITINERARY

Meetings were held on March 21 and 22, 1994, in the London area; on March 23 to 25 in the Paris area; and on March 28 in Bergisch Gladbach, near Cologne, Germany.

European Sites Visited

Transport Research Laboratory (TRL), Technical Information and Library Services, Crowthorne, England
Representative: Mrs. Barbara Crofts, Library Manager

Department of the Environment and Department of Transport, The Library, London, England
Representatives: Mrs. Judith Deschamps, Manager of Information Services; and Ms. Karen Lewis, Supervisor of Information Services

The British Library, IRS DIALTECH, Science Reference Information Service, London, England
Representative: Mr. Roy Kitley

Laboratoire Central des Ponts et Chaussées, (Central Laboratory for Roads and Bridges), Paris, France
Representatives: Mme. Andrée Veillat, Chief of Documentation; and M. Jean-Luc Buisson, Chief of Information Services

Conference Européenne des Ministres des Transports, (European Conference of Ministers of Transport), Center of Documentation, Paris, France
Representative: Mme. Paulette Coquand, Head of Documentation Center

Institut National de Recherche sur les Transports et leur Sécurité, (National Research Institute for Transportation Safety), Arcueil, France
Representatives: M. André Imbert, Director of Information Services; and Mme. Marlene Choukroun, Manager of Scientific and Technical Information

François Libmann Associés, Paris, France
Representative: Mme. Aurélie Bordelet, Manager of Studies

Service d'Etudes Techniques des Routes et Autoroutes, (Center for Technical Studies on Roads and Motorways), Bagneux, France
Representatives: Mme. Catherine Mallaret, Manager of Documentation Service; Mme. Liliane Sardais, Librarian; and M. J.C.E. Boiteux, International Programs Coordinator

Bundesanstalt für Strassenwesen, (The Federal Highway Research Institute), Bergisch Gladbach, Bensberg, Germany
Representatives: Mrs. Helga Trantes, Chief Bibliographer and Documentalist; Mrs. Susanne Berns, Manager of IRTAD Database; Mr. M. Canavan, International Coordinator; Dr. G. Peter Strunk, Head of the Central Division of BASt; Mr. Fischer and Mrs. Baum (representing Forschungsgesellschaft für Strassen und Verkehrswesen)

SITE DESCRIPTIONS AND PURPOSE OF TRANSPORTATION INFORMATION CENTERS

This chapter describes the sites visited. The following are also discussed: funding source, purpose of the center, and the responsibilities and activities related to the IRRD database or other transportation databases. Sites involved with IRRD are discussed first, followed by the ECMT database site, then the ESA-IRS and FLA Consultants sites.

IRRD Sites

Transport Research Laboratory (TRL), Library Services

TRL is located in Crowthorne, Berkshire County, England. Funding for TRL is mostly through private contracts. Currently, only about 25 percent of the funding is through direct government support. TRL is considered an executive agency of the Department of Transport. The Library at TRL (currently managed by Mr. Colin Howard) supports TRL research and has built up a collection of books, conference proceedings, research papers, and journals on subjects such as traffic engineering, highway planning, pavement design, accident studies, and vehicle design. TRL publishes three series of reports (research reports, application guides, and contractor reports) as well as state-of-the-art reviews and *Current Topics in Transport*. The serial list contains more than 850 titles. Also available is a video and film library of TRL's research projects. Items can be purchased singly or through a deposit account. Audiovisual material can also be borrowed. Library membership is another feature.

The Library at TRL holds two major international databases of transport and road information, known as TRACS and PROJEX. The databases contain details of published material (TRACS) on subjects related to roads and road transport, and information on research (PROJEX) being undertaken in the United Kingdom and other countries. The databases are supplemented by information received from sources around the world because of their participation in International Road Research Documentation (IRRD). The Library searches these databases for clients for a fee and provides customized literature searches and monthly printouts on particular subjects to keep customers abreast of current developments in their fields. (These databases are, for the most part, an offline version of IRRD.) The TRL Library is an internationally recognized information broker and is a member of the European Information Researchers Network (EIRENE).

The TRL Library is the depository library of IRRD, as well as the English-language linguistic center for the database and a founding member of IRRD. OECD pays TRL a management fee for coordinating the IRRD database and producing document entries. TRL prepares abstracts for all British road research. As the depository library, it receives all English-, French-, and German-language bibliographic (and abstract) entries from its own linguistic center, as well as from LCPC (France) and BASt (Germany). As the English-language linguistic center, TRL receives entries from participating IRRD member countries that use English when submitting entries. This group includes the United Kingdom (UK), the United States, Canada, Australia, and

Sweden; other countries may occasionally send entries. (For the most part, TRL does not perform translations; it returns entries to the participating member.) New entries (approximately 1,000 per month) are sent by tape to ESA-IRS (Frascati, Italy), the host vendor of the IRRD database. In the last three years, 37,612 entries have been loaded into the IRRD database. TRL also keeps track of research in progress; however, submissions to the center are irregular, and there are no follow-up resources or mechanisms to track every current project from participating members.

Departments of the Environment and Transport (DOET), The Library

Both departments of the United Kingdom's DOET are located in London. The Department of Transport funds most of the transportation research in the UK, including science and technology in support of its policy, and statutory, operational, regulatory, and procurement responsibilities. It aims to increase national prosperity and help improve the quality of life through its role in sustaining the development of an efficient transport system. Research has an important role in meeting this aim, primarily in the areas of safety, congestion, environmental impact, and value for money in procurement of infrastructure. Most of the research projects are contracted out to the private sector.

The DOET does not publish any research series, and dissemination of reports has been a problem. Transportation research is not well coordinated because of the autonomous nature of the directorates.

The Library now supports both departments but will soon be under the direction of the Department of the Environment. The Library has a collection of publications produced by both departments, as well as a serial collection. It publishes an annual list of publications that documents what has been published by both departments. The Library primarily supports the staff of both departments, but documents are also available to the public via interlibrary loan requests. For the most part, government research reports can be purchased through TRL or the British Library.

The Library depends on TRL to identify which documents published by the DOET will be included in the IRRD database. The Library does not send bibliographic entries to TRL for IRRD submission.

The Library is responsible for collecting current research (both ongoing and recently completed) over a broad range of environmental and transport subjects. Data are collected via surveys sent to the contract researchers and local governments and authorities (approximately 300 to 400) in the UK. Most survey data (bibliographic citation, abstract, and other documentation information) are sent to The Library on disk. The data are checked and then sent to the London Research Center (LRC) for loading onto tape. The LRC produces RESLINE, which is accessible online to anyone who pays the subscription fee. The database is updated twice yearly. The database contains approximately one-third of the Department of Transport's recent research.

Some of the database entries sent by The Library to LRC are also sent (if the subject content is appropriate) to ECMT for inclusion in the TRANSDOC database.

(Since the trip, two additional library and information centers have been formed to meet the needs of the restructured DOET. A Department of Transport information center was created. This center has approximately 250 journal titles, approximately 2,500 monographs, and various series of official publications. A separate Department of Transportation Library has been developed for the newly created Highways Agency.)

Laboratoire Central des Ponts et Chaussées (LCPC) (Central Laboratory for Roads and Bridges)

LCPC is located in Paris and is part of the Ministry of Transport, which is part of three agencies: The Ministère de l'Equipement, des Transports et du Tourisme (Ministry of Public Works, Transport, and Tourism). LCPC has approximately 500 on staff, 200 of whom are researchers. This laboratory is involved with roads, bridges, and soils; it also conducts applied research; much contracted to private companies. LCPC publishes technical reports on its research, which appear in the *Bulletin de Liaison des LCPC, Etudes et Recherches des LCPC, Techniques et Méthodes des LPC*, and various catalogs. LPCP also offers a technical report series.

The library maintains a collection of LCPC-sponsored research publications and a large serial collection. It has publication exchange agreements with many organizations worldwide. The support staff can make material available to the public through interlibrary loan when duplicates of the document are available. Many library services reports are also available at the British Library and the Institut de l'Information Scientifique et Technique (INIST), and are available online through ESA-IRS. The library also list an audiovisual collection.

LCPC is the French-language linguistic center for IRRD and is a founding member of IRRD. LCPC receives bibliographic and abstract entries (on tape or floppy disk) from France, Canada, Spain, Italy, Belgium, and Switzerland. French-language journals are scanned as well. LCPC checks content of entries. Entries (in French) are loaded on tape monthly and sent to TRL. LCPC does not offer translations. LCPC has submitted approximately 5,475 entries to the IRRD database in the last three years. For the most part, the entries have come from France (LCPC, INRETS, SETRA), Spain, Canada, and Belgium. LCPC also keeps track of research in progress of IRRD members. It does not conduct surveys or follow-up telephone calls to access this information, which organizations send on an irregular basis. However, the participating French research organizations must be involved in the process as part of their contractual obligations. They are also responsible for preparing the thesaurus for the IRRD database.

Institut National de Recherche sur les Transports et leur Sécurité (INRETS) (National Research Institute for Transportation Safety)

INRETS headquarters is located in Arcueil, a suburb of Paris. Funding for INRETS comes primarily from the Ministry of Research, but the Ministry of Transport provides some funding. INRETS is involved primarily with road and traffic safety and engineering, driving simulation, ergonomics, ground transportation, and the environment. Much of the research is contracted to private companies. It publishes 10 to 20 research reports a year; a catalog of INRETS publications, *Catalogue des Publications*; and an annual

research-in-progress publication, *Programme Présentation des Projets et Recherches par Domaines.*

The library services maintain a collection of INRETS-sponsored research publications and have a serial collection. They also have exchange agreements with organizations worldwide. They support INRETS staff and their various research laboratories. Documents are available for purchase from the Service des Publications. Some documents may be free of charge. INIST sells INRETS publications. INRETS publishes a periodical, *Recherche Transports Sécurité*, which has a subscription fee. It also has an audiovisual collection.

INRETS is a cooperative member of IRRD and sends bibliographic entries and abstracts (in French) to LCPC. It translates abstracts into English as well. Most of these entries are research reports and publications produced by contractors. The contractors are responsible for producing the document entry sheet, which is sent to LCPC on disk. INRETS staff checks format and content. INRETS sends entries from published reports, journal articles, communication papers to Congress, and "gray literature" (working papers or theses). In the last three years, INRETS has sent more than 220 document entries to LCPC for inclusion in the IRRD database. INRETS also contributes to the TRANSDOC and PASCAL databases.

INRETS has its own internal database (FIRST), which includes reports and other documents produced by and for INRETS. It is an internal database only. INRETS plans to put key documents on CD-ROM and a research-in-progress in-house database is in the works. Some document entries overlap those sent to IRRD.

Service d'Etudes Techniques des Routes et Autoroutes (SETRA) (Center for Technical Studies on Roads and Motorways) Documentation Services

SETRA is located in Bagneux, another suburb of Paris. As a technical department of the Department of Public Works, Transport, and Tourism, as well as the Department of Development (Housing), it intervenes in the fields of planning, design, construction, maintenance, and operation of highways and motorways and their dependencies. Within the French Road Administration (Directorate of Roads), SETRA is responsible for the following tasks:

(1) assistance in the definition and implementation of the road policies of the Central Directorates of the Ministry; (2) design, implementation, and evaluation of technical policies; (3) steering of the technical network of the Ministry Organization and information within the road profession; (4) international technical information, cooperation, and advertisement of French know-how; and (5) expertise at national and international levels. SETRA also conducts economic feasibility studies and is responsible for setting standards and regulations. It contracts research to private consulting firms. SETRA publishes five series covering security, statistics, road construction, and bridges.

The Documentation Center supports the headquarters and regional offices. The center maintains a collection of SETRA-sponsored research publications, as well as serials and other publications, standards, and regulations. More than 8,000 documents are on record in its computerized card catalog system. The Documentation Center is available for

public use but offers no outside lending privileges to the general public. It publishes a monthly catalog of documents available, *Documentation Information,* and an annual catalog of publications, *Catalogue des Publications*. Items in the catalog can be obtained directly.

SETRA is a cooperative member of IRRD. It sends bibliographic entries and abstracts (in French and English) to LCPC. However, SETRA does not translate material. Similar to LCPC and INRETS, most of the entries are the research reports and publications produced by its contractors. It also includes standards and regulations for entries. SETRA contributes little research in progress to IRRD. It has no staff to maintain this file. SETRA staff checks the entries submitted by contractors and is responsible for scanning and indexing a selection of journals. In the last three years, SETRA has sent more than 500 document entries to LCPC for inclusion in the IRRD database.

Bundesanstalt für Strassenwesen (BASt)

BASt is located in Bergisch Gladbach-Bensberg, east of Cologne, Germany, and is the technical and scientific agency of the federal government. Its task is to work on the problems arising from the various relationships between people, motor vehicles, highways, the environment, and society. Its main areas are highway construction technology, bridge construction and structural engineering, behavior and safety, traffic engineering, and automotive engineering. It is also the central accident research center. BASt acts as scientific advisor to the Federal Ministry of Transport on technical matters and transport policy, while also providing expertise in report preparation and field and laboratory investigations. BASt collaborates with other research institutions, especially universities, and has close contacts with the Road and Transport Research Association (Forschungsgesellschaft fur das Strassen- und Verkehrswesen), the German Road Safety Council (Deutscher Verkehrssicherheitsrat), state highway authorities, and the industrial sector.

The Library, Translation Service, and Documentation Systems are under one group, which is responsible for maintaining the serials and publications of BASt, as well as coordinating IRRD for German-language participating countries. The group maintains a research-in-progress file.

BASt is the German-language linguistic center for IRRD. It coordinates the input of the cooperating countries and organizations using the German language. German data entries are sent monthly to TRL. Three countries and seven organizations participate, among them: in Germany, Bundesanstalt für Strassenwesen (BASt) and Forschungsgesellschaft für Strassen-und Verkehrswesen e. V. (FGSV) (German Road and Transportation Research Association, responsible for tunnel and bridge research); in Austria, Bundesversuchs-und Forschungsansanstalt Arsenal (BVFA) and Kuratorium für Verkehrssicherheit (KFV); and in Switzerland, Office Federal des Routes (OFR), Ecole Polytechnique Fédéral de Lausanne (EPFL), and Office Fédéral de la Police/Bundesamt (BAP). The Library part of the group decides what publications will be included in IRRD. Material that BASt selects is in the BASt library. Its databases are written by experts in their fields. Subject experts also choose the keywords. The author's summary is not used for abstracting. BASt prepares and merges data entries and runs data through

a check program system (CF6). In the last 3 years, BASt has sent about 5,000 German-language entries to the IRRD database. It does not translate material into German. Research in progress is updated every three years. The German standards are also included.

German-language research materials are also located in the University of Hanover Library (Universitatsbibliothek und TIB), which serves as Germany's depository library. BASt can supply documents that it has sent for inclusion in IRRD.

BASt is also involved with OECD's International Road Traffic and Accident Database (IRTAD). BASt is coordinating and collecting accident data sent by cooperating OECD countries; they provide tables shells for input. The database is updated two or three times per year. Access is available through the BASt computer, and BASt charges an annual fee. These data are also available on disk. In addition, BASt is involved with ECMT's TRANSDOC database. It coordinates indexing and abstracting activities, which are conducted by outside institutes and universities. It compiles all the data entries and sends them to ECMT, which gets 400 to 500 records per year.

ICTED Site

Conference Européenne des Ministres des Transports (European Conference of Ministers of Transport [ECMT])

ECMT is an intergovernmental organization with headquarters located in Paris. The Council of the Conference comprises the Ministers of Transport of 30 European countries. The work of the Council of Ministers is prepared by a Committee of Deputies. The purposes of ECMT are as follows:

- to make every effort to achieve (at general or regional level) the most efficient use and rational development of European inland transport of international importance; and

- to coordinate and promote the activities of international organizations concerned with European inland transport, taking into account the work of supranational authorities in this field.

ECMT concentrates on the following fields: transport policy, investment in the sector, infrastructural needs, rail development, waterway transport, combined transport issues, urban travel, road safety and traffic rules, signs and signals, access to transport for people with mobility problems, new technologies, environmental issues, and integration of Eastern European countries in the European transport market.

The Documentation Center manages the ECMT library, which specializes in international transport economics and is the basis for the International Cooperation in Transport Economics Documentation (ICTED) system and its TRANSDOC database. The Center is responsible for managing the general activities of the ICTED/TRANSDOC network, organizing meetings, and publishing documentation. The abstracts, including bibliographic citations, are drawn up in standardized format, in either English, French, or German, by participants (member countries' specialized agencies, e.g., libraries of the Ministries or documentation centers of research institutes) and sent to the ECMT Documentation Center either in machine-readable form (floppy disk) or in hard copy. The abstracts are then revised, checked, and stored in the TRANSDOC

bibliographic database. Data processing is carried out using microcomputers linked via a local area network to the server storing the database. The revised information is then loaded onto the international host computer (ESA-IRS) and becomes available online throughout the world.

The following publications lay down the rules and information processing procedures of the ICTED/TRANSDOC system: *ICTED Operating Rules, List of Descriptors in Transport Economics, List of Periodicals Abstracted, Input Form, DOC-STAR,* and *TRANSDOC/ESA-IRS User Guide.*

Documents in TRANSDOC are not available at the ECMT Documentation Center; however, they are available through the publishers, central agencies that produced the reports, INIST, and the British Lending Division of the British Library.

Other Sites

The British Library, IRS DIALTECH, Science Reference Information Service

This site, located in London, represents a European Space Agency Information Retrieval Service (ESA-IRS) center for the United Kingdom. ESA-IRS (Frascati, Italy) is the market-leading European online host for the provision of information to the scientific, technical, industrial, and institutional communities in the ESA member states. International in origin and character, it has been providing online information to users in Europe and throughout the world for more than 20 years. With more than 200 databases in a broad range of subjects and powerful searching capabilities, ESA-IRS brings rapid access to vital information for industry, businesses, research establishments, and academic institutions throughout the world.

This center provides instruction and training in use of the database and also takes subscription orders. Databases on the system cover various highway, transportation, and automobile industry topics. Following is a list of specific databases, which cover highway and land transportation topics:

- ABI/INFORM,[8,9] UMI/Data Courier, Kentucky: management science, economics;
- ACOMPLINE/URBALINE, London Research Center, England: management science, building and construction;
- COMPENDEX PLUS,[9,10] Engineering Information, Inc., New York: building and construction, engineering;
- INSPEC,[9,10] The Institute of Electrical Engineers, New Jersey and England: physics, electronics, electrical and computer engineering;
- IRRD, OECD, Road Transport Research Program, Paris: transportation, geology;
- NTIS,[9,10] National Technical Information Service, U.S. Department of Commerce, Maryland: multidisciplinary science and technology (includes transportation);
- PASCAL,[9] Institut de l'Information Scientifique et Technique–Center National de la Recherche Scientifique, Vandoeuvres-les-Nancy, France: multidisciplinary (includes civil

engineering);

- PREDICASTS NEWSLETTER,[9,10] Predicasts Europe, London: industry news, government funding programs;

- MHIDAS, Health and Safety Executive, Sheffield, England: hazardous material incidents; and

- TRANSDOC, ECMT, Paris: transport systems and economics.

These subject databases are described in detail in the reference handbook.

François Libmann Associés (FLA)

François Libman Associés is located in Paris. This consulting firm specializes in information brokerage. It performs brokering, publishing, database producing, consulting for database training and assistance, and marketing services for database producers and hosts. FLA is currently preparing, for INRETS, an international guide of information sources regarding transportation. It has mailed surveys to more than 500 potential transportation information centers. The selection of participants was determined by INRETS and FLA. The project is expected to be complete by the fall of 1994.

ANALYSIS OF FINDINGS

Visits to the main transportation information database producers and coordinators in Europe brought the team an understanding of the subject content of these databases; the criteria for selection of material, language, and document type; maintenance of a research-in-progress file; and availability of document acquisition services.

The primary international transportation database is IRRD, which is produced under the auspices of the OECD. The database, which is accessible through the online vendor ESA-IRS, is available in the United States. It covers published scientific and technological literature from around the world, including international journals and research series as well as announcements of ongoing research projects. Research reports, books, articles from journals, statistical communications, summaries of research in progress, theses, standards and specifications, and conference proceedings are scanned. The main subjects are design of roads and related structures, materials, soil and rock mechanics, drainage construction, pavements, bridges and tunnels, maintenance, traffic and transport, vehicles, accident studies, economics, and administration. Information is provided through 40 major technical institutes from 24 countries. The database contains more than 246,000 records in English, French, and German. (Most of the 850 journals and series article entries included in the IRRD database are sent to TRB for inclusion in TRIS. TRIS includes only these entries (and other document-type entries) if a coinciding English title and abstract are included in IRRD's submission. Most of the documents identified through the IRRD database are available through online ordering from four foreign document suppliers: British Library Document Supply Center, INIST DIFFUSION (France), Delft University of Technology (Netherlands), and Universitatsbibliothek und TIB (Germany). The U.S. supplier is DYNAMIC INFORMATION/Article Express (California). A percentage of these documents may also be available through document-delivery vendors accessible through DIALOG and national transportation libraries and information centers, such as Northwestern University,

University of California – Berkeley, TRB, and the U.S. Department of Transportation's Library.

TRANSDOC is probably the second largest database producer of transportation information, even though it concentrates on the subject of transport economics. The database is available through the online vendor ESA-IRS. The file contains abstracts of monographs and books, studies, brochures, serial publications, reports, theses and other academic literature, and patent documents published in ECMT and associated countries. English, French, German, and other languages are used according to the source. Subjects covered include transport systems and economics; political, planning, sociological, and management aspects; inland transport and links with maritime and air transport; urban, domestic, and international transport; environmental, energy, and land use issues.

The IRRD and TRANSDOC databases do offer research-in-progress files, which they include in their databases. However, the files are not maintained and kept as up-to-date as the producers would like. Submission of current research is at the discretion of the participating members of the two databases. Survey forms requesting information on research-in-progress matters have been sent, but the coordinating centers provide minimal follow-up. Thus, these databases may not be reliable in terms of providing the latest information on foreign research projects.

Other international scientific and technical information databases (TRANSDOC, PASCAL, and ACOMPLINE/ URBALINE) also provide coverage of transportation topics, but not to the extent of IRRD. The TRANSDOC database, which is produced by ECMT and is also available online via ESA-IRS, covers transport economics. It holds 34,100 recorded entries in the database; the entries are in English, French, and German. Most of the same foreign (except INIST) and U.S. document suppliers used for IRRD can also be used to acquire documents identified in this database. The PASCAL database, produced by INIST (Scientific and Technical Information Institute) of the French National Research Council is one of the largest general science databases in the world, with more than 8.9 million entries. Civil engineering topics are included. All records have bibliographic information in French. However, since 1982, the titles and keywords have also been given in English. All of the records entered in PASCAL are available through INIST and the aforementioned foreign and U.S. document suppliers. ACOMPLINE/URBALINE is produced by the London Research Center and is also available online via ESA-IRS. This database contains more than 360,000 references on major European urban affairs, including transportation issues. The database is available in English, and most of the same foreign (except INIST) and U.S. document suppliers used for IRRD and TRANSDOC can also be used for this database.

The U.S. highway and transportation community can easily access the world's main producers of highway and transportation information and literature through subscriptions to ESA-IRS and DIALOG, both available in the United States. The subscription fee (not including the cost of connect time and print charges when conducting a literature search) to these databases is relatively inexpensive: less than $200. These online information

retrieval vendors also provide direct access to document suppliers, by providing online ordering services. Thus, the problem of determining how to acquire these foreign documents is virtually nonexistent, because an online ordering mechanism is available. The average time it takes to receive documents from these foreign document suppliers has not been investigated in detail. However, it is probably faster and more economical (if labor time is included) to use these online services than to use traditional librarian methods.

One task objective of the trip was to determine the percentage of publications or abstracts translated into English, the criteria used by the publishing agency to select items for translation, and the lag time in making translated materials available to the public.

The two main foreign highway and transportation information database producers (IRRD and TRANSDOC) do not have resources to translate document records that they receive from participating IRRD and ICTED (TRANSDOC) members. In the case of IRRD, each linguistic center coordinates the collection of document records in English, French, or German. It is up to IRRD members to submit entries in one of these three languages and then send the entries to the respective linguistic center. The linguistic centers check the content of the document record and may revise the entry to meet grammar, bibliographic, and IRRD worksheet submission rules. However, incomplete and uninterpretable document entries are returned to the participating IRRD members. Again, the linguistic centers do not offer translation services. Based on data available from TRL on entries submitted in the last 3 years, approximately 70 percent of the document records in IRRD are in English. Overall, approximately 65 percent of entries are in English. In the case of TRANSDOC, the ICTED members submit document entries to ECMT, which is responsible for coordinating all activities of the TRANSDOC database. The group collects English, French, and German document records as well and also checks entries for grammar, bibliographic, and ICTED worksheet submission rules. On occasion, it also conducts English and French translations, but that is not the norm. Document entries are returned if further translation is needed. Approximately 37 percent of the document records in TRANSDOC are in English.

The criteria used by the publishing agencies (coordinating centers) to select items for translation are not really applicable, because all types of published documents are accepted for inclusion in the databases if they meet the subject criteria and are in one of the three working languages (English, French, or German) offered by the databases.

Both databases submit document entries to the host vendor (ESA-IRS) monthly. Any lengthy lag time between submission of translated materials and availability in the database reflects on the participating members of the IRRD and ICTED and their ability to submit properly translated material to the central coordinating centers for IRRD (TRL, Crowthorne, England) and ICTED (ECMT, Paris, France). The issue of lag time before translated materials are made available to the public is not applicable, because IRRD and ICTED participating members must submit entries in one of three accepted languages (English, French, and German).

The IRRD and TRANSDOC databases scan more than 1,350 journals and serials, of which approximately 25 percent are

U.S. titles, which are probably available through domestic transportation, academic, and special libraries or publishers. With respect to other types of documents, there is overlap in the IRRD and TRIS databases. Thus, many documents identified in IRRD were originally published in the United States and can be acquired through routine librarian requests or use of U.S. document delivery services. The availability of foreign documents (identified in these international databases and not of U.S. origin) in U.S. transportation libraries and information centers is probably low. However, access to document ordering services via online host vendors (accessible in the United States) supposedly provides almost 100 percent certainty of acquiring foreign documents identified in these foreign databases. (This is true if the document ordering service and the online database vendor work cooperatively.)

Another objective was to identify procedures for foreign document acquisition.

The procedure for acquiring technical materials developed abroad is basically the same for individuals as for libraries or special collections staff. If a subscription to the foreign online host vendor is in place, the ordering procedure is relatively straightforward. When references are selected from a literature or information search, the items of choice are put into a separate set. The order is placed by typing several commands (including the document supplier code) and watching the system acknowledge that an order has been placed with that specific document supplier. Domestic document suppliers usually take one to three weeks to deliver the documents, unless 48-hour speed service is chosen (at a higher price). Foreign document suppliers may use a similar time frame. Document delivery time depends on the type of document requested, the in-house collection of resources of the supplier, and the economics of speed service.

Documents can also be ordered directly through these foreign document suppliers. Ordinarily, the only requirement is either to establish a deposit account or to submit a check or money order with each order. Document orders can be placed by contacting the supplier, identifying the documents needed, confirming the order, and waiting for delivery. Document suppliers to the international highway and transportation databases (IRRD, TRANSDOC, PASCAL, and ACOMPLINE/URBALINE) include the following:

- British Library Document Supply Center (England);
- INIST DIFFUSION (France);
- Delft University of Technology Library (Netherlands);
- Univeritatsbibliothek ünd TIB (Germany); and
- DYNAMIC INFORMATION Corporation/Article Express International (United States).

Documents can be ordered from these suppliers through online access or through direct contact, using a deposit account or direct payment process. The reference handbook provides the names, addresses, and telephone numbers of these vendors.

TASK C2B: SUMMARY OF VISIT TO TRANSPORTATION INFORMATION CENTERS IN JAPAN

BACKGROUND

The objective of Task C2b was to conduct an inventory of the technical materials produced by transportation organizations in Japan and assess their availability in the United States. To fulfill this objective, the contractor team and COTR visited transportation information centers in Japan. The team conducted a comprehensive investigation to identify transportation information databases, how they are maintained, how information is collected and by whom, and what criteria are used for information selection and translation.

Specific task objectives included the following:

- determining the percentage of publications or abstracts translated into English (if any), the criteria used by the publishing agency to select items for translation, and the lag time before translated materials are made available to the public;
- comparing the number and type of technical materials produced in Japan to what is actually available in the United States; and
- presenting the procedures for acquiring technical materials developed in Japan for individuals and for libraries and special collections.

ITINERARY

Meetings were held May 31 through June 3, 1994 in Tokyo.

Japanese Sites Visited

Public Works Research Institute (PWRI), Tsukuba-shi, Ibarki-Ken, Japan, Traffic Engineering Division, Representatives: Mr. Makota Nakamura, Chief of Traffic Engineering Division; Mr. Shigetoshi Kobayashi, Manager of PWRI Center; and Mr. Tomiaki Sakai, Library Manager of PWRI

Japan Construction Information Center (JACIC), Tokyo, Japan, Representatives: Dr. Tokuji Tokumaru, Executive Director; Mr. Katutoshi Yoshikawa, Manager of Database; Mr. Shimizu and Mr. Yatanabe, Information Management Department

Ministry of Construction (MOC), Tokyo, Japan, Representative: Mr. Nobuyuki Kitani, Deputy Director, Planning Division, Road Bureau

Japan Information Center of Science & Technology (JICST), Tokyo, Japan, Representatives: Mr. Katsuhiro Takano, General Manager, Office of International Affairs; and Mr. Izumi Iketani, Senior Information Manager, Civil Engineering and Architecture Division, Abstracting and Indexing Department

Japan Digital Road Map Association (JDRMA), Tokyo, Japan, Representative: Mr. Masao Shibata, Executive Managing Director

Japan Society of Civil Engineers (JSCE), Tokyo, Japan, Representative: Mr. Todao Kawamura, Manager, General Planning and Public Relations Division

SITE DESCRIPTIONS AND PURPOSE OF TRANSPORTATION INFORMATION CENTERS

This section describes the sites that were visited. The following are discussed: funding source; purpose of center; responsibilities and activities related to the transportation databases; and other characteristics.

Public Works Research Institute (PWRI)

Ministry of Construction
1, Asahi, Tsukuba-shi,
Ibaraki-ken, 305 Japan
Tel: 81-298-64-2211
Fax: 81-298-64-2840

PWRI is a division of the Ministry of Construction. This division conducts basic and applied research in the technical areas related to road and traffic safety, the environment, river, water quality control, dams, erosion control, material and construction, structures and bridges, and earthquake disaster.

The division is also involved with international exchange in technical research and hosts conferences to encourage the establishment of technologies and research activities in other Asian countries, as well as in United Nations member countries and the United States.

The Research Information and Library

Division is part of the Planning and Research Administration Department of PWRI. It is responsible for reference service, management, and operation of the library and for editing and distributing research reports and other publications. The library has more than 150,000 publications (about 23 percent in English); and about 1,400 journals and magazines or serials, of which 800 are in Japanese, 350 in English, and the rest in French, German, Russian, or Italian. The library has most of the bulletins from the Japanese universities, as well as standards and regulations ("Brown Book"), encyclopedias, and directories.

PWRI's Library Collection

TYPE OF DOCUMENT	COUNTRY	NUMBER OF TITLES
Books	Japanese Other Foreign	49,926 29,641
Other Material*	Japanese	63,654
Serials	Japanese Other Foreign	800† 400†

* Monographs, audiovisual material, standards and regulations.
† Estimates based on conversations with staff during visit.

The library can be used by PWRI staff, librarians in Japan, and others who are given special permission by PWRI. It has an exchange agreement with more than 285 organizations in 55 countries. In addition, the library staff uses database information retrieval resources, including those from JICST, JACIC, and DIALOG.

The PWRI Research Center has an online database of the 3,200 publications (title lists) in its library. No file on research in progress is maintained in the database. Records can be searched by record number, keywords in title, author, and publication year. Less than five percent of the publications are in English. The PWRI Research Center also keeps an online version of the library's card catalog system. Searches can be made by author and title. Only PWRI staff can access their online database.

PWRI participates in IRRD. Before 1987, Japanese transportation information was submitted to IRRD by the International Road Federation (IRF). PWRI took over this assignment in 1988. The IRRD system is coordinated by Mr. Shiego Murato, a researcher in the Traffic Engineering Department. The Road Research Collection Committee of the Japan Road Association sends requests for submission to IRRD to more than 400 government agencies, universities, public corporations, and private companies. Replies are sent back to the committee, where support staff collect and make decisions on what records are to be sent to IRRD. The records are sent to PWRI, where they are standardized to meet IRRD working rules. PWRI is responsible for data entry of records. The data are sent (in English) on disk to TRL (English linguistic center for IRRD). The records

are also sent to the Japanese Construction Information Center (JICST) and the Civil Engineering Research Institute (CERI).

In 1993, PWRI sent about 100 records to TRL for inclusion in IRRD. However, only 12 records entered the database. The remainder of the records were incomplete, because PWRI did not have access to IRRD's working rules. In 1994, PWRI obtained the working rules of IRRD and has begun to send records (in English) every other month to TRL.

PWRI publishes a large number of research reports, journals, and other material (300 per year, of which about 100 are translated into English at the discretion of PWRI), such as the following:

- Report of PWRI (selected papers);
- Journal of Research (selected papers in English);
- Technical Note of PWRI (selected classified domestic and foreign research);
- Technical Memorandum of PWRI[10];
- Cooperative Research Report;
- PWRI Annual Report;
- PWRI Newsletter (quarterly)[11]; and
- Civil Engineering Journal (monthly) (compiled from research results and civil engineering topics).

A listing of the 3,200 reports published by PWRI (and cleared for release by the Director General) is free upon request via letter or fax. The list contains the title, key words, the author's name and department section, year of issue, and total number of pages in the report. Requests for the list and report copies should be addressed to Mr. Tomoaki Sakai, Director of Publications and Editing Department, Public Works Research Center, Ibaragi-Ken Tukaba-shi, Nishazawa 2-2, 101, JAPAN, Tel: 0298-64-2521, Fax: 0298-64-2515.

Reports are free while supply lasts. They are not reprinted. PWRI will photocopy research reports, at a cost of $0.50 per page, on request (June 1994).

Japan Construction Information Center (JACIC)

JACIC is a nonprofit organization supported by the government and the private sector. Its board consists of members of construction, utilities, and communication companies, as well as the staff of the National Diet Library. Established in 1985 to systematically gather information on construction, JACIC plays the central role in the organization of construction information in Japan. This information is used by government and business sectors.

JACIC has developed a construction information database. The data are gathered from the Ministry of Construction (MOC), local public organizations, and private corporations. Once gathered, data are categorized and entered into the database, which is called JACIC NET. The database contains information on types of service: electronic bulletin-board service; communication service; gateway service; and instructions on database use.

JACIC is active in the following areas:

- a standard estimation system of public works for local governments and construction bureaus;

- an estimation technology toward the rationalization and simplification of estimation;
- a construction results information system (CORINS) database;
- an information exchange system on construction waste;
- furnishing of the numeric data from a basic form-planning map (scale 1 to 2,500) (JACIC TOWN);
- map Information Quarterly System for searching registers from a map (JACIC MIQ);
- Geographic Information System (GIS);
- technical information systems of rivers and roads;
- construction technical information system;
- register and query system of technical references and geologic survey data; and
- region planning information system (REPIS) to promote regional policy.

JACIC conducts courses, participates at expositions and conferences, and publishes material including the following:

- *JACIC Information* (bulletin);
- *JACIC News* (public relations brochure);
- *Cost Estimation Technology* (bulletin); and
- *Construction Technical Handbook.*

The JACNET database is available only in Japan on a subscription basis. The database is operated from the Nippon Telephone and Telefax (NTT) computer system. Users are government and local authorities (1,300), general contractors (800), and other construction consultants (150). The subscription fee (1994) is 100,00 yen per year ($1,000/year), and connect time is 200 yen per minute ($2/minute).

For the U.S. transportation community to access this database, a site location in Japan is needed because of tariff regulation. In addition, the data are in Japanese, and only a minimal number of construction projects are open to international bid. Currently there are no U.S. subscribers.

In 1993, users spent 12,800 minutes on the database. Each user averaged 10 minutes. The most popular database (60 percent of use) is the "Quick Report on Personnel Changes in the Ministry and Public Corporation" the second most popular is "Today's News" and the third is "Quick Report on the Budget for Public Works." JACIC expects "Bid Announcements" to gain in popularity.

Ministry of Construction (MOC)

MOC was established in 1948. It consists of four branches: bureaus and divisions, regional bureaus and branches, road work, and related organizations.

Road work is carried out by MOC and local public bodies. Funds for road work are available from tax revenues, which include a gasoline tax designated to be used exclusively for road work, and general sources (motor vehicle purchase tax, raised through general taxes).

The project team visited MOC's Road Bureau, Road Traffic Control Division Office. The bureau has internal databases for planning and maintenance purposes. One is very similar to road maintenance logs used in the United States. These road logs contain information on pavement surface characteristics, including pavement condition and position. This information is not accessible to anyone outside the office.

Through the National Police Agency, MOC also has use of the traffic accident database of the Institute for Traffic Accident Research and Data Analysis (ITARDA). ITARDA systematically collects the data and expertise accumulated by various government and agencies, then conducts comprehensive investigations and analyses of traffic accidents. Various agencies contribute to the database, including the National Police Agency (traffic accident data and licensed driver data), Ministry of Construction (road data), Ministry of Transport (vehicle data), and other groups (e.g., social economy index). ITARDA also contributes to the International Road Traffic and Accident Data (IRTAD) system produced by the Federal Highway Research Institute (BASt) of Germany.

Japan Information Center of Science and Technology (JICST)

JICST is a nonprofit organization for the advancement of science and technology in Japan. It was established in 1957 under a legislative act. JICST collects, processes, and disseminates scientific and technical information published in Japan and other countries. JICST is self-supporting but also has financial assistance from the Japanese Government. The total budget approved by the government is approximately U.S. $169 million. JICST has approximately 325 employees.

The four JICST objectives are as follows:

- collecting scientific and technical information quickly and comprehensively on a global scale;
- processing information, building subject databases, and being a depository for primary documents;
- providing services such as online access to databases, document delivery, photocopying, translation, and other services; and
- providing technical development and international cooperation in the field of scientific and technical information through conferences and other meetings.

JICST collects periodicals, technical reports, conference proceedings, reprints, data files, and other material ("gray literature") not only from Japan but also from more than 50 nations. Its database covers practically every scientific discipline. JICST extracts bibliographic data (title and author of an article, journal title, volume, number, and publishing year) from accepted documents, then produces the abstracts and index terms using more than 100 information specialists, with additional cooperation from specialists in the scientific community. Annual production amounts to approximately 690,000 citations in Japanese. An English-langauge database, JICST-E, is also available, and approximately 260,000 records with abstracts are produced annually. As of February 1993, there were 1.55 million records in JICST-E. About seven percent

of this database covers civil engineering topics.

More than 50 percent of the journal titles in the database cover the fields of medicine, agriculture, mechanical engineering, and chemistry and chemical engineering. Civil engineering topics are included in the field of construction engineering, which comprises approximately seven percent of the journal titles in the database. More than 50 percent of the journal titles are from Japan. English-language journals from the United States, United Kingdom, and Canada make up about 27 percent of the journal titles. Germany, the Netherlands, the former Soviet Union, France, Switzerland, Italy, and others provide the remaining journal titles.

In the field of civil engineering, main topics include tunnel and bridge engineering, railway facilities and construction, road engineering, hydraulics and hydrotechnical engineering, environmental engineering, transport traffic and service, road transportation and service, rail, water, and air transportation service, and mining engineering. Of interest to highway information users are the following subtopics are included under road engineering and road transportation:

Road Engineering

- road engineering, general (e.g., types of roads, road improvements, road economics);
- road planning and surveying, road structures; and
- road facilities and construction.

Road Transportation

- road transportation, general (e.g., policy, administration, economy, industry);
- road traffic noise and vibration;
- traffic control, regulations, monitoring (e.g., traffic surveys);
- traffic control surveillance and regulations;
- driver licensing and driving performance;
- motor vehicle accidents and traffic safety; and
- transportation methods and facilities.

Much of the civil engineering material comes from the Public Works Research Institute. JICST also gets technical reports from the contractors themselves.

Currently, the JICST database contains approximately 5,045 records that include the term "highway(s)," 10,059 records that include the term "transport" or "transportation," and 225 records that include the term "road construction."

JICST-E is the only JICST database product available in the United States. It operates through the STN computer network (JICST, Chemical Abstracts Service (CAS), 2540 Olentangy River Road, P.O. Box 3012, Columbus, Ohio 43210, 800-848-6538, 614-447-3751 (fax). After an account has been established, STN can be accessed using any terminal or personal computer connected to a telecommunications service (e.g., Internet, Tymnet). JICST-E costs $77 (as of June 1994) per connect hour

and $0.51 per print of a record.

JICST provides document delivery service for all records identified in the JICST and JICST-E databases. It also offers SDI service and retrospective search service, as well as a thesaurus in English and Japanese.

This information center holds an annual conference in the United States to promote the JICST databases. This year's event is cosponsored by the U.S. Department of Commerce's National Technical Information Service (NTIS).

Japan Digital Road Map Association (JDRMA)

JDRMA was founded in 1988 to establish the standards for a digital road map (DRM) and to produce a DRM database in Japan. JDRMA is supported by private companies in the automotive, electronics, mapping, and measurement industry, as well as by Japan's Ministry of Construction, Roads Bureau.

Database production is currently using 1/25,000 scale topographical maps. The database has complete detail on about 52 percent of the roads in Japan, and only some coverage on the remaining roads; and the total data volume is approximately two gigabytes.

Car navigation is currently the largest application of DRM. Approximately 130,000 vehicles are equipped with a navigation system that uses DRM derived from JDRMA's database.

The database is created using configuration information published by Japan's Geographic Survey Institute and the latest attribute information from road administrators.

The DRM database is available only to its supporting member countries and local governments and quasi-governmental organizations. There are 15 supporting members and 10 organizations that originally contracted for production of the database (Ministry of Construction's Region Construction Bureaus, Hokkaido Development Bureau, and Okinawa General Bureau). The U.S. transportation community does not have access to this database. However, JDRMA staff frequently attend Intelligent Vehicle Highway Systems conferences held in the United States and disseminate information about the database and the technology used in creating, managing, and using it.

Japan Society of Civil Engineers (JSCE)

JSCE was founded in 1914 and is a prestigious academic association, with more than 35,000 members from all domains related to civil engineering, including scholars, officials, and engineers of private companies. JSCE produces several publications, including *Civil Engineering in Japan* (English and Japanese versions) and has a cooperative arrangement with JICST and the Japanese National Center for Scientific Information Systems (NACSIS). Documents are sent to these organizations for inclusion in their databases. JSCE also has the international activities. It corresponds with academic associations and research institutes of various countries in an effort to promote the exchange of technical information and academic products. The team learned that JSCE has a close relationship with the American Society of Civil Engineers.

JSCE's library, established in 1964, has approximately 30,000 documents and other materials relating to civil engineering. The collection has more than 1,230 journal titles, of which 350 are foreign, from over

20 countries. The library holdings also include government reports, conference proceedings, standards and regulations, and audiovisual material. The library has two full-time librarians who provide service to members and the public. They can provide reference service to the U.S. transportation community. The library averages approximately 7,000 visitors per year. About 70 percent of these visitors are consultants or general contractors. Practically all of the civil engineering documentation and other materials are available at JSCE, Tokyo University, PWRI, or the National Diet Library (Japan's version of the U.S. Library of Congress).

The library's card catalog system is accessible at the library through an online database system. In addition, the staff uses online literature searching databases, such as JICST, COMPENDEX, IRRD, and NACSIS.[12] JSCE is not a document supplier to the public. However, documents can be photocopied in-house for a fee.

ANALYSIS OF FINDINGS

Visits to the main Japanese agencies and organizations that have information and databases on the subjects of highways and transportation helped the team understand of what is available in Japan and how accessible this information is to the U.S. transportation information user.

The team visited six agencies or organizations during the trip to Japan. Team members visited the government's Ministry of Construction's (MOC) Public Works Research Institute (PWRI) and the Road Bureau's Planning Division (for traffic safety, structural standards, and international affairs); as well as two nonprofit private information centers: the Japan Construction Information Center (JCIC) and the Japan Information Center of Science and Technology (JICST). In addition, they visited the Japan Society of Civil Engineers (JSCE) and Japan Digital Road Map Association (JDRMA).

For the most part, the agencies and organizations rely on government and some private-sector support to maintain their transportation libraries, information centers, and databases. JICST claims to be somewhat self-supporting, relying on connect time, printout costs, and document delivery fees from subscribers to its database of general scientific reference information. JSCE is probably the most self-supporting organization, relying on the membership dues of more than 35,000 people and fees charged for publications and conference registration.

Although each agency or organization maintains a computerized database of its reference collection (PWRI, JICST, and JSCE) data files (JCIC and JDMRA), the information in these databases is mostly in Japanese and accessible only by in-house staff (PWRI, JSCE) or subscribers in Japan (JCIC, JICST, and JDRMA).[13] In addition, these groups do not network with each other; nor is there any future effort to link some or all of the Japanese transportation information sources to provide a "one-stop shop" database on highway and transportation technology, research, and other types of materials. Thus, identifying highway and transportation information from these organizations is probably very tedious and time-consuming, even for Japanese engineers.

One task objective was to determine the percentage of publications or abstracts translated into English, the criteria used by the publishing agency to select items for

translation, and the lag time in making translated materials available to the public.

Most of the transportation information produced in Japan is in Japanese. For the government and nonprofit agencies, only a selected number of documents and materials are available in English. The selection criteria are based on decisions from MOC. The agencies and organizations visited either did not know or would not reveal how the decision process works. JICST provides the greatest amount of English-language information through its JICST-E database, available through STN International (Columbus, OH). However, because JICST is supported through the government to some extent, the decision on what gets included in JICST-E probably comes from MOC. PWRI provides a small percentage of reports in English. Again, the decision on what gets translated into English is at the discretion of MOC.

The U.S. transportation community would need interpreters and translators to readily access Japanese information on specific highway topics. U.S. transportation users with limited budgets for information and translation services resources would have very limited ability to access scientific and technological information from Japan.

Another objective was to make a comparison between technical materials produced in Japan and those available in the U.S.

Only a very limited selection of transportation material produced in Japan is available through U.S. sources. Some of the transportation libraries in the United States (such as the University of California's Institute of Transportation Studies Library) have a selection of Japanese journals, publications, and other material; but for the most part the collections are very small and scattered.

For the U.S. highway and transportation information user, the most practical way to search for domestic availability of a specific Japanese transportation-related document would be to access the OCLC or RLIN online bibliographic catalogs. At least a national search can be conducted for the document. For Japanese-language titles, searching for the document may be difficult, due to transliteration issues. Some vendors[14] are also offering a clearinghouse of Japanese business and scientific documents. For minimal fees, a request can be made for English-translated documents. However, at this time, it is doubtful whether a large quantity of translated documents is available on the topic of transportation.

If a person is unsuccessful using the OCLC or RLIN system and the document is very important, it is probably worthwhile to use an international document-delivery vendor. Many of these vendors claim that they can easily get Japanese publications (in English and Japanese) from their sources in Japan. This service is expensive. In addition, document delivery time may be a few weeks to several months.

Another objective was to identify procedures for foreign document acquisition.

The agencies and organizations visited that have libraries and document depositories (PWRI, JICST, and JSCE) do provide service to the public, including requests from the United States. However, there is no one-stop shop database system set up among the Japanese transportation libraries. Direct correspondence with these agencies is the best (and only)

method for identifying or acquiring known documents in Japan. Fax, letter, or E-mail correspondence is probably the best way to place these requests.

Another way is to contact one of the four resource agencies and organizations that contain almost all of the civil engineering documents and material produced in Japan. They are PWRI and JSCE (both places visited), the University of Tokyo, and the National Diet Institute (Japan's equivalent of the U.S. Library of Congress).

Japanese documents can also be acquired in the United States by accessing JICST-E online (available through STN International) and other online document-delivery vendors, which are accessible through online search service vendors (such as DIALOG).[15] Documents can be ordered from these suppliers through online access or through direct contact, using a deposit account or direct payment process.

AUSTRALIAN TRANSPORTATION INFORMATION

The Australian Road Research Board (ARRB), P.O. Box 156, Nunawading, 3131, Australia; 500 Burnwood Highway, Vermont South, 3133; Telephone (03) 881-1555, International (61 3) 881-1555, Fax (03) 887-8104, International (61 3) 887-8104, produces a transportation database called ROAD. The database is produced and maintained by ARRB's Information Services. It is available for online searching by overseas clients through the National Library of Australia's OZLINE Information Network. The management of OZLINE can be contacted at the National Library of Australia, Canberra ACT 2600, Australia. Their fax number is (61 6) 273-1180. The database is also available in CD-ROM format on INFORMIT's Engineering and Applied Science ROM; ARRB can provide subscriptions to this database.

ROAD includes significant material published about road transport, particularly from Australia, but also from the UK and the United States. Some European and Asian material is also included. Australian material is indexed fully and overseas material is indexed somewhat more briefly. ROAD currently contains some 70,000 records. Approximately 5,000 to 6,000 records are added each year.

ROAD has the following components:

- all publications produced by ARRB since its founding in 1960;
- all additions to the ARRB library since 1984 and most of the items accessioned by the library before 1984;
- Australian journal articles and conference papers (published in Australia or overseas);
- some Australian publications from 1977 not held in the ARRB library;
- overseas journal articles and conference papers from 1988; and
- a listing of Australian road research projects.

Selection of items for inclusion depends on various criteria, which include current research interests and the quality of the items concerned. Subject coverage include the following

- road economics, management, and planning;
- road design, construction, and maintenance;
- pavement design, performance, and management;
- bridges, tunnels, and structures;
- geotechnical engineering, soil mechanics, and drainage;
- materials used in roads and structures;
- transport economics, management, and planning;
- traffic control, data management, and modeling;

- road safety, accidents, and human factors;
- vehicles, fuel, and energy;
- environment, pollution, and sociology; and
- instrumentation and information technology.

Most ROAD records reflect the holdings of ARRB's library, but records are also contributed by other relevant libraries in Australia.

ARRB sends a certain number of records from ROAD to the IRRD database. All records chosen for IRRD correspond to items published in Australia and New Zealand. They are of high quality in terms of content and correspond to only subject areas that are of interest to the producers of IRRD. In 1993, AARB sent 251 records to IRRD; in 1992, it sent 590. (ARRB can provide listings of conference proceedings and periodicals that are regularly scanned for inclusion in ROAD.)

CITATION AND DOCUMENT ACQUISITION ANALYSIS OF FOREIGN HIGHWAY INFORMATION IDENTIFIED IN FOREIGN AND DOMESTIC TRANSPORTATION DATABASES

One of the subtasks in Task C2 involved analyzing the bibliographic citations found in foreign and domestic transportation databases and identifying the percentage of full-text documents readily available to the U.S. transportation community. To meet the objectives of this subtask, an exercise was conducted using the five most popular transportation databases in this country: TRIS, NTIS, COMPENDEX, IRRD, and TRANSDOC. The search involved using the term "highway(s)" and the prefix fields document source ("non-U.S.") or document language ("non-English"), depending on what each database accepted. Once records were identified in a search set, a random selection[16] of records, totaling 50, was pulled from the set and printed. Each database brought up a different set of records. There were no overlapping records.

Once 50 records were selected from each database, the complete bibliographic citation for each record was printed. These records were sent to Northwestern University's Transportation Library staff, who have extensive experience in locating domestic and foreign transportation documents and material. For each citation, the staff provided a "best estimate" of the name and address for ordering documents, the time it would take for delivery, and the expected costs (e.g., loan or photocopy fee and document purchase cost). The staff used the bibliographic information from the citation, the searching of other online bibliographic databases such as OCLC, RLIN, Illinet Online, etc., and their personal experience and intuition to perform this exercise.

An analysis of the records retrieved from the transportation information databases commonly used in the United States showed the following:

TRIS

Analysis showed that almost half of the foreign documents would have to be ordered through foreign sources (i.e., document-delivery vendor, government or research agency, corporate source). Since the database includes many foreign records, especially from the OECD and ECMT, many of the documents need to be ordered from abroad.

For the documents identified, the average time of document delivery (including mailing) would be slightly over two weeks; and the average cost of the document would be approximately $20.

NTIS

The study showed that all of the documents could be ordered through domestic sources. Despite the fact that all NTIS records found in the database are available in full text at the NTIS clearinghouse, it is not always the most efficient and cost-effective way to obtain the document. The analysis showed that 63 percent of the documents need to be ordered through NTIS. The remainder could be found at academic libraries and through document-delivery vendors in the United States. However, it is important to note that all foreign documents identified in NTIS can be obtained through NTIS. There is no need to use the more time-consuming process of seeking foreign

sources.

For the documents identified, the average time for document delivery (including mailing) would be more than 1½ weeks; the average cost of the documents would be slightly more than $18.

COMPENDEX

All of the documents identified in the search could be ordered through domestic sources, and about three-fourths of the documents are readily accessible through academic libraries. Interestingly, all of the documents identified are available in the United States. Nevertheless, this database is important to consider when looking for foreign transportation information, because of the high probability of acquiring the full text domestically.

For the documents identified, the average time for document delivery (including mailing) is almost two weeks; the average cost of the document is approximately $10.

An analysis of the records retrieved from the foreign transportation information databases showed the following:

IRRD

Almost half of the documents identified in the search could be ordered through domestic sources, and are available through academic libraries. This finding suggests giving serious consideration to use of this database when searching for foreign transportation information.

For the documents identified, the average time for document delivery (including mailing) is approximately one month; and the average cost of the document is approximately $19. For documents available through a domestic source, delivery would probably be within two weeks.

TRANSDOC

Analysis showed that only about 35 percent of the foreign documents identified in the search could be ordered through domestic sources and are available through academic libraries. In addition, almost one-third of the documents would need to be ordered through a foreign government or corporate source, which takes a long time. However, since TRANSDOC is on the same host (ESA-IRS) as IRRD, it should at least be considered in a search if IRRD is also being used in the course of the same search.

For the documents identified, the average time of document delivery (including mailing) is slightly less than one month, and the average cost of the document is approximately $24.

The data are summarized in Table 2.

In summary, the analysis showed quite clearly the extra time involved in document delivery for records identified in the two foreign transportation databases. However, costs for document delivery were similar across all databases, with the exception of COMPENDEX, which was almost $10 to $15 lower than the rest of the databases. (This could be attributed to Engineering Information, Inc.'s determination of what is significant and worthy of inclusion in the database; another factor is that the records are from popular foreign journals and reports, which most large academic libraries would have in their holdings anyway.) However, when transportation information databases are used for staying current about foreign technology and research, the percentage of foreign documents identified

in these databases as available in the United States appears to be remarkably high (100 percent) for two of the five databases (NTIS and COMPENDEX) and relatively high (50 percent) for two others (TRIS and IRRD). In fact, the percentage of documents available from domestic sources (36 percent) for even the remaining database (TRANSDOC) is high enough to warrant recommending that all of these databases should be routinely accessed by the U.S. transportation community in identifying and acquiring foreign information in their field. However, at this time, two host online vendors would be needed, one for TRIS, NTIS, and COMPENDEX, and one for IRRD and TRANSDOC.

Table 2. Foreign Document Acquisition Analysis of Transportation Database Citation Records*

Database	Average Time (in weeks) for Document Delivery[x]	Average Cost (U.S.$) for Document[xx]	Source (Percentage)			
			Domestic		Foreign	
			Private Document Delivery Vendor, Non-academic Library	Academic Library[△△]	Private Document Delivery Vendor[●]	Government, Research Organization, Private Corporation
TRIS**	2.3 wks	$19.80	19%	32%	45%	4%
NTIS[†]	1.6 wks	$18.30	70%[△]	30%	0%	0%
COMPENDEX[†]	1.8 wks	$9.60	25%	75%[△]	0%	0%
IRRD[††]	4.0 wks	$18.70	2%	47%	29%	22%
TRANSDOC[††]	3.8 wks	$24.20	2%	34%	30%	34%

* Random sample of 50 records retrieved from a literature search using the terms "highway(s)" and non-U.S. source or non-English language type.

** Available on DIALOG only.

† Available on DIALOG and other hosts.

†† Available on ESA-IRS only.

x Mailing was estimated as follows: 1 week for foreign source and half a week for domestic source.

xx Domestic loan fees from Northwestern University Transportation Library (NUTL) were estimated at $10. Domestic photocopy fees from NUTL were estimated at $8, which was based on $5 for document returned, $0.15 per page for first 10 pages, and rounded off to nearest dollar. Foreign fees were estimated from past experience.

△ The NTIS document clearinghouse was needed for 63 percent of document acquisitions.

△△ NUTL can provide the following document (percentage) for each database: TRIS (21 percent); NTIS (29 percent); COMPENDEX (23 percent); IRRD (38 percent); and TRANSDOC (20 percent).

● TRL (England) was included in this category. Other document suppliers included The British Supply Center (England) and INIST (France).

RECOMMENDATIONS

Based on results of the task assignments (survey, compilation of reference services and sources for identifying and acquiring foreign information, and information gathered on the visits to foreign transportation information database producers and suppliers), several areas need to be improved relating to information use and service in order to provide better opportunity for the FHWA, State DOT's, and others in the transportation community to identify and access foreign transportation information. Such improvements would increase the flow of information from abroad assisting the U.S. highway community in implementing innovative technologies and practices developed abroad. Areas of improvement include the following:

1. The highway community does not have sufficient access to foreign (or domestic) information resources or document acquisition services. Existing library and information centers cannot provide services to all sectors (public, private, and academic) of the U.S. highway community. (For example, the private sectors have only limited access to academic or State DOT libraries. In addition, the FHWA and State DOT employees who are geographically removed from a central transportation library (or in States without a DOT library) need better access to information services.

2. U.S. highway practitioners do not have adequate education and training in using information resources for seeking and acquiring foreign (and domestic) transportation information and documents.

3. Librarians and information professionals do not have sufficient opportunity to network with their users or counterparts from abroad.

4. Transportation libraries and information centers do not adequately share catalog and database resources.

5. Translation services for foreign language materials are not readily or economically available. In addition, machine translation software products are not used enough.

6. TRIS, the primary U.S. transportation database, does not include foreign-language records (except for those in the TLIB subfile), nor does it provide current awareness service on foreign-based technology.

Recommendations (based on the findings) suggested to meet the foreign (and domestic) information needs of the U.S. transportation community include the following:

1. Improve access to information resources by developing a national transportation library system linking key transportation libraries, establishing a national highway information policy, and allocating resources to promote use of foreign and domestic transportation information databases, as well as resources for acquiring foreign materials.

2. Provide education and training to U.S. highway practitioners in how to use information resources for identifying and acquiring foreign and domestic information and documents.

3. Conduct periodic international conferences for transportation information providers and users and highway engineers and researchers.

4. Develop national transportation information links connecting catalogs and databases from different U.S. libraries and information centers into one network.

5. Provide better access to translation services to promote an increase in the acquisition of foreign-language information and documents relevant to transportation topics. Investigate machine-translation products as well.

6. Provide resources for TRIS to include translations of foreign-language records and produce current awareness products (bibliographies and abstracts) on foreign-based documents in TRIS and on specific topics.

Details on each recommendation follow.

Improve access to information resources by developing a national transportation library system linking key transportation libraries, establishing a national highway information policy, and allocating resources to promote use of foreign and domestic transportation information databases, as well as resources for acquiring foreign materials.

A national transportation library system should be developed to provide the U.S. transportation community with access to current foreign and domestic information and documents. This system should comprise the leading transportation libraries in the country (including academic, State, and Federal). Resources should be made available for these libraries to provide the means to link and share their collections (similar to an OCLC Group Access Center [GAC] resource sharing system set up by OCLC Online Computer Library Center, Inc., where GAC subscribers can borrow documents from any participating OCLC GAC member for free), as well as promote and provide information services to the public, academic, and private sectors of the U.S. transportation community.

The national transportation library system needs to be backed by the establishment of a national highway information policy, which would make the acquisition of foreign and domestic transportation materials a priority as well as provide services to the highway community. With the policy in place, resources should be made available to support the following:

- promotion of transportation libraries and information centers, and reference and interlibrary loan services;

- improvement of the ability of the private sector to access these services (readily and economically);

- education and training of highway engineers;
- periodic international conferences with transportation library professionals and engineers;
- cooperative information exchange agreements with agencies abroad (especially database producers IRRD, TRANSDOC, ROAD, JICST);
- development of foreign document collections (including serials);
- promotion of reference handbooks and other foreign and domestic information and document acquisition sourcebooks and contacts;
- development of specialized bibliographies (with abstracts) from TRIS on foreign-based and key topic areas (based on technological priority);
- awareness through highway conference exhibit rooms of document delivery suppliers, information brokers, and document clearinghouses that specialize in transportation documents; and
- inclusion of U.S. transportation libraries and other transportation information providers in the INTERCHANGE database of PIARC.

Resources should be allocated to provide FHWA, State DOT library staff, and engineers with more and better access to online transportation bibliographic databases (such as TRIS, NTIS, COMPENDEX, IRRD, and TRANSDOC), as well as their CD-ROM products. The feasibility of using the AASHTO VAN or local area networks (LANs) to access TRIS online, as well as to access the CD-ROM products for NTIS, COMPENDEX, and upcoming TRANSPORT (SilverPlatter Limited's combined TRIS, IRRD, and TRANSDOC databases) needs to be investigated, since it is likely that the costs of using these databases may be out reach of many State DOT and other highway practitioners. (Table 3 provides the tentative price schedule for TRANSPORT.) The ability to access these databases through gateway communication servers provides a means to keep up with current foreign information on advanced technology and new practices in the field. Education and training would be needed to familiarize the transportation community with how to access and use these database products. More extensive training would be needed for those who would frequently access these databases.

Table 3. TRANSPORT CD-ROM Tentative Price Schedule[17] (1995)

File Years	Number of Users			
	Single User	1 Networked User	2-4 Networked Users	5-8 Networked Users
1968 to present	$1,795	$2,244	$2,693	$3,590
1988 to present	$1,295	$1,619	$1,943	$2,590

Provide education and training to U.S. highway practitioners in how to use information resources for identifying and acquiring foreign and domestic information and documents.

U.S. highway practitioners need better awareness of the electronic and manual sources used for identifying and acquiring foreign (and domestic) transportation information. This can be accomplished through training workshops and educational material such as a reference handbook and technology transfer factsheets, video and other media, such as an electronic bulletin board systems.

Training workshops should be conducted throughout various regions in the United States. These workshops could be provided in one- to two-day sessions. The program for the workshops would include techniques in accessing and using online databases and other CD-ROM products, as well as general instruction on how to search for information and where to find sources for documents.

Preparation for the training workshops would require the following steps:

- development of course outline, curricula, and workshop materials;
- preparation of instructor's guide, participant workbook, other course material (reference handbook, video, etc.) and presentation materials;
- arrangement of workshop schedule;
- pilot study presentation, evaluation, and modification of presentation; and
- presentation and dissemination of course material (such as reference handbook and *Directory of Transportation Libraries and Information Centers in North America*, R. McHenry, C. Cortelyou, 6th Ed., 1993) at the workshop.

It is recommended that the workshop development and training be conducted by a team of transportation information professionals and engineers. Staff time would be devoted to developing and preparing material for the workshop, as well as presenting the course. It is suggested that two to three team members do the presentation. Travel and per-diem costs for the team would also need to be considered. (Additional time, staff resources, and expert media and communication professionals would be needed to develop a video.)

In addition to training workshops, the dissemination of educational material should be a high priority. The reference handbook (developed through this study), which would also be used as instructional material at the workshop, should be actively promoted to inform U.S. highway practitioners of its content and availability. The FHWA, TRB, academic transportation libraries, and the Special Libraries Association, Transportation Division, should take the lead in promoting this handbook. This document could be disseminated through FHWA, TRB, NTIS, AASHTO, etc. The handbook could also be made available through electronic media currently used by the FHWA, AASHTO, and other State DOT's (such as the AASHTO VAN) or some other source, such as a 1-800 dial-up online service. In addition, sections of the handbook could be released as technology transfer factsheets, which could be made available through print or electronic media.

The reference handbook would provide FHWA and the other members of the U.S. transportation community with a reference tool to use in locating sources for identifying and acquiring foreign (and domestic) transportation information documents. The handbook should include the following topics:

- North American transportation libraries and information centers and a description of their special collections and availability of online catalogs;
- commercial online database vendors;
- CD-ROM database products;
- transportation-specific databases and a description of their content;
- document-delivery vendors covering foreign literature;
- international highway and transportation associations;
- international highway and transportation research centers; and
- international transportation libraries (and contacts) and a description of their collections.

The handbook could also include other information, such as how to access electronic bulletin board services, and how to conduct an online literature searching.

A team of transportation information professionals (including academic and State librarians) and engineers should be involved with an annual update of the handbook to keep the document current with the latest information services and sources. Resources should be made available for this ongoing project.

Conduct periodic international conferences for transportation information providers and users and highway engineers and researchers.

International conferences should be periodically held (perhaps biennially and at annual TRB or SLA conferences) to provide highway and transportation information specialists, researchers, and engineers with more opportunities to network and exchange information sources and technological issues. The conferences would bring together transportation librarians from the United States and abroad to work toward improving the flow of technical information worldwide. The conferences would also be targeted toward highway engineers interested in learning how to access information from abroad.

Resources should be made available to produce conference proceedings and transcripts from the conference. (Translation of the conference into a select number of languages should also be considered.) Information from the conference proceedings and transcripts would provide reference material, as well as be included in the update of the reference handbook.

Develop national transportation information links connecting catalogs and databases from different U.S. libraries and information centers into one network.

National transportation information links connecting catalogs and databases from existing transportation libraries are recommended. Transportation libraries and information centers need to share information on foreign documents and information collections and provide the database links with periodic updates of recent foreign acquisitions and put them into one network. Communication servers (Internet, FEBBS, AASHTO VAN) could provide the means for these libraries and information centers to link up and share their resources (such as the content of their card catalogs and serial lists, especially foreign subscriptions). Initially, a select set of libraries (those with the largest collections of highway material, such as Northwestern University's Transportation Library, University of California – Berkeley Institute of Transportation Studies Library, U.S. DOT Library, etc.) could be used in a pilot program. Additional libraries could be included in the network. The linking of card catalog systems is technically possible through a gopher server. For example, at Northwestern University's Infrastructure Technology Institute Library Services Program, a gopher server is set up to access online public access catalogs (OPAC's). The library adds any OPAC's they find that have a collection strength in transportation. An Internet gopher could be established to provide an OPAC, which would serve as a national transportation link connecting catalogs and databases from different libraries.

Provide better access to translation services to promote an increase in the acquisition of foreign-language information and documents relevant to transportation topics. Investigate machine-translation products as well.

Resources should be made available to promote and provide limited and extended translation services of bibliographic citations, abstracts, and documents to highway practitioners. Contractors (available through the national transportation network) should be used to provide translations of titles and other bibliographic citation elements and abstracts, as well as journal articles, research reports, and other full-text documents. These translation services should be cost-effective for the U.S. transportation community. With limited budgets for translations, decisions on whether to order full-text documents in foreign languages can be more wisely made with the opportunity to read translated citations and abstracts and reducing the chance of missing key information from abroad.

Translation services are relatively expensive ($.08 to $.16 per word). However, access to the world's information on the latest technological developments and new practices in transportation realistically requires this service. Translation costs are surely much lower than funding projects and research that have already been conducted abroad.

Copies of translated documents and other material should continue to be forwarded to AASHTO, TRIS, and the transportation libraries (Northwestern University or University of California – Berkeley) that contribute to TRIS (to be indexed and entered onto the database). Translated documents should also be sent to the national library system participants when it is established. These documents need to be indexed and entered onto OCLC. With these recommendations in place, identification of and access to translated foreign documents will improve tremendously for the highway practitioner.

The applicability of machine-translation software should also be investigated. These products appear to be a partial solution to expensive translation services. Software programs vary in price, but quotes for some products have been in the range of $600 to $1,000. There is some debate on the effectiveness of these software programs. A certain amount of editing is required after the translation has been made. This seriously reduces the advantage these programs would have over translation, since additional editing time and costs are involved.

In addition to the post-editing problems, another disadvantage of machine-translation software programs is the fact that they generally contain limited technical vocabularies and do not include a large selection of transportation terms. Resources are needed to investigate software vocabularies and work with machine-translation software representatives to develop products with expanded vocabularies that would meet the needs of libraries for cataloging; the needs of TRIS for abstracts, titles, and keywords; and the needs of highway practitioners who are looking for economical and expeditious ways to translate documents.

Development of more practical machine-translation software products should be shared with the national transportation library system participants. Access to this software would greatly enhance the decisions to acquire foreign-language documents throughout the network, creating a greater probability of identifying important developments and practices from abroad.

Provide resources for TRIS to include translations of foreign-language records and produce current awareness products (bibliographies and abstracts) on foreign-based documents in TRIS and on specific topics.

Resources are needed for TRIS to translate the non-English-language records that are submitted by IRRD and TRANSDOC to the TRIS database, as well as the TRANSPORT CD-ROM database. The TRANSPORT CD-ROM will include English, French, German, and Spanish records. However, non-English-langauge records (including the title, other bibliographic citation elements, and abstract) will not be translated into English. A multilingual thesaurus of descriptor words for the database is planned for mid-1995. With the updated version of the product, searches can be made using words from the descriptor field thesaurus. Thus, the terms used in the search will include "translated" terms in the other languages (and will automatically be included in the search). However, this will not solve the problem of determining the content of the non-English-language records for making decisions on the acquisition of foreign documents.

Resources should also be made available to TRIS to provide annual bibliographic

1 Provisions of the Intermodal Surface Transportation Efficiency Act (ISTEA) gave the FHWA the authority "to engage in activities to inform the domestic highway community of technological innovations abroad that could significantly improve highway transportation in the United States, to promote United States highway transportation expertise internationally, and to increase transfers of United States highway transportation technology to foreign countries. Such activities may include (1) development, monitoring, assessment, and dissemination domestically of information about foreign highway transportation innovations that could significantly improve highway transportation in the United States" (Public law 102-240, December 18, 1991, 105 STAT.2168, SEC 6003, §325).

3 Information gatherers are defined as the people who either get information for other people (such as librarians) or seek information themselves. End-users are defined as people who use the information to perform their jobs.

4 An excellent source for libraries and information centers is the *Directory of Transportation Libraries and Information Centers in North America,* 6th edition, June 1993 (Renée E. McHenry and Catherine Cortelyou). More than 120 libraries and information centers are described in the directory, which covers name, address, and telephone and fax numbers, collection size and description, subject strengths, special collections, hours of operation, interlibrary loan policy and fees, other fees, database systems, staff, and library publications. The directory includes the libraries and information centers that have specialized collections on the topics of roads, highways, traffic engineering, and safety.

5 OCLC Online Computer Library Center, Inc. (OCLC), Mail Code 236, 6565 Frantz Road, Dublin, OH 43017, 800-848-5878, in Ohio, 614-764-6000. OCLC offers Group Access Center (GAC) resource-sharing networks. Member libraries (with specific subject areas) can form a group membership in OCLC. Outside (selective) members can access services through full members, thereby reducing costs and allowing more access to many members.

6 ATA, 1735 Jefferson Davis Highway, Suite 903, Arlington, VA 22202, (703) 412-1500.

7 Gordon, Suzanne, "They share a love of all languages," *The Philadelphia Inquirer,* October 9, 1993, p. B3.

8 Ruber, P., *Reseller World Magazine,* August 1992.

9 Also in DIALOG.

10 Also in Data-Star.

11 Some in English.

12 English version published.

13 The NACSIS data bases contain Japanese- and English-language entries concerning technical documents generated by Japanese educational institutions and research organizations affiliated with Japan's Ministry of Education, Science and Culture. The six data bases are as follows: Grant-in-Aid Research Papers (KAKEN); Conference Papers of Academic Societies and Associations (GAKKAI); Index to Dissertations (GAKUI); Database Directory (DBOR); Union Catalogue of Japanese Periodicals (JSCSAT); and Union Catalogue of Foreign Periodicals (FSCAT). The NACSIS data bases are available through Internet.

14 JICST does provide access to JICST-E for U.S. users via STN. However, the data base has only a small collection of civil engineering references.

15 "What's New From the Japanese Virtual Library," InterLingua, Inc., 423 South Pacific Coast Highway, Redondo Beach, CA 90277, (310) 792-3643.

16 The Task C1 Report identifies document-delivery vendors that acquire documents from all over the world, including Japan.

The method used to assure a random selection of records in the analysis involved pulling off every nth record until 50 records were selected and the records in the search set were depleted. For example, if the set had 2,000 records, every 40th record was selected to reach a total of 50 records (i.e., 40, 80, 120...1,920, 1,960, 2,000).

17. Jeff LaPlante, SilverPlatter Information, Inc., personal communication, October 1994.

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